

UNCLASSIFIED

AD NUMBER: AD0896853

LIMITATION CHANGES

TO:

Approved for public release; distribution is unlimited.

FROM:

Distribution authorized to U.S. Gov't. agencies and their contractors; Administrative/Operational Use; 09 NOV 1977. Other requests shall be referred to Office of Naval Research, Arlington, VA 22203.

AUTHORITY

ONR ltr dtd 09 NOV 1977

THIS PAGE IS UNCLASSIFIED

THIS REPORT HAS BEEN DELIMITED
AND CLEARED FOR PUBLIC RELEASE
UNDER DOD DIRECTIVE 5200.20 AND
NO RESTRICTIONS ARE IMPOSED UPON
ITS USE AND DISCLOSURE.

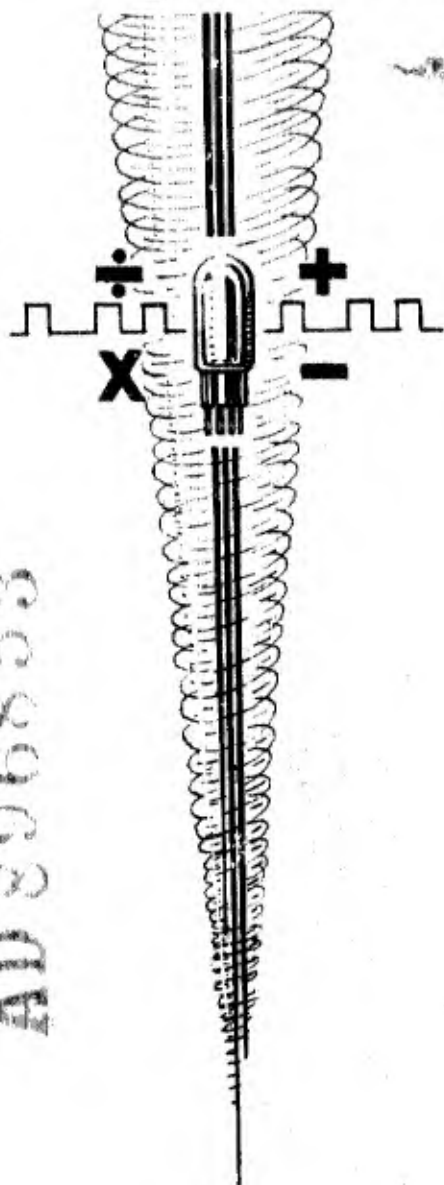
DISTRIBUTION STATEMENT A

APPROVED FOR PUBLIC RELEASE,
DISTRIBUTION UNLIMITED.

UNANNOUNCED

PROJECT
WHIRLWIND

Contract N5ori60



AD 896853

SUMMARY REPORT NO. 2

VOLUME 13

SYSTEM DRAWINGS

118350

SERVOMECHANISMS LABORATORY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

NAVY RESEARCH SECTION
SCIENCE DIVISION
REFERENCE DEPARTMENT
LIBRARY OF CONGRESS



784349
784166
DDC
Copy 3
MAR 15 1974
RECEIVED

OCT 25 1951

SPECIAL DEVICES CENTER

AC 104163 66

WFO

WFO

UNCLASSIFIED

10/11/01

2

①

Page 1 of 13



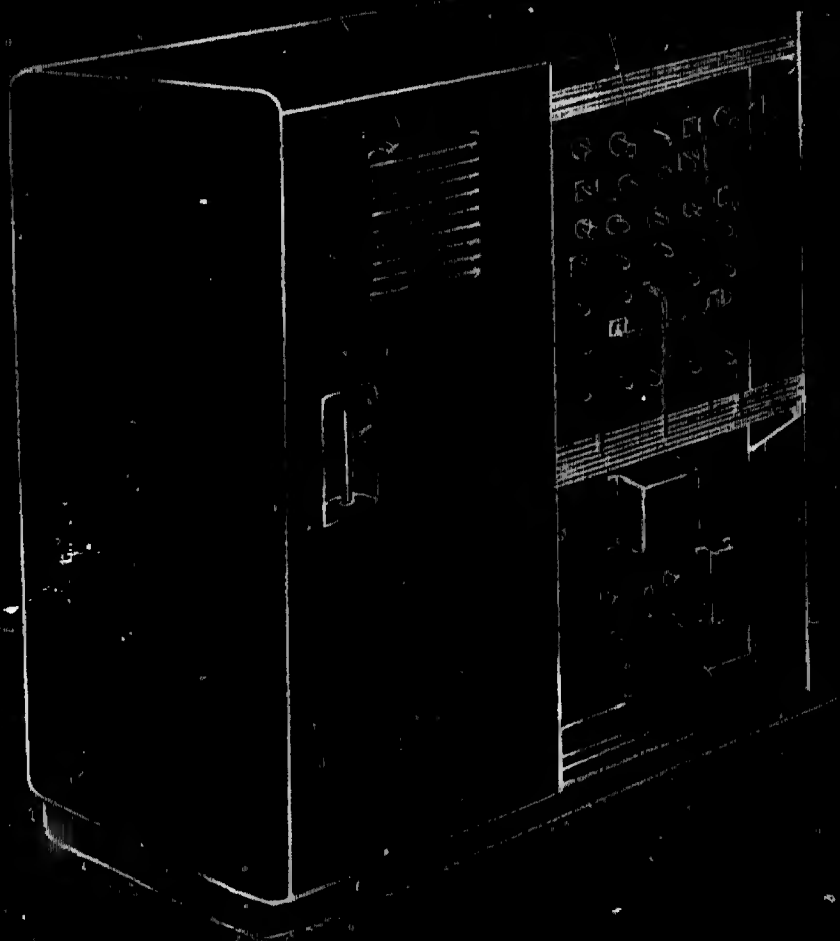
12

Volume 13 of 22 Volumes

FIN = 1.11

DDC
RECEIVED
MAR 15 1974
RECEIVED
E

Servomechanisms Laboratory
Massachusetts Institute of Technology
Cambridge, Massachusetts



WHIRLWIND I

WHIRLWIND I is a computer system developed by the Massachusetts Institute of Technology (MIT) in the late 1940s. It was one of the first digital computers to use vacuum tubes for memory storage. The system was designed to perform complex calculations and was used for a variety of scientific and engineering applications. The Whirlwind I system consisted of a large cabinet containing a control panel and internal components. The control panel featured a grid of circular indicators or lights, some of which were labeled with letters. Below the grid, there were several smaller components, possibly switches or relays. The cabinet was shown from a three-quarter perspective, highlighting its depth and the internal structure. The drawing is a technical illustration, likely from a manual or a technical document.

CONTENTS

Frontispiece

M-147, pages 3-5, Introduction

M-147, page 6, System Drawing List

System Drawings

E-68

E-53

M-147, page 7, Control Drawing List

Control Drawings

M-147, page 8, Storage Drawing List

Storage Drawings

M-147, pages 9, 10, Arithmetic Element Drawing List

Arithmetic Element Drawings

M-147, page 11, Register Drawing List

Register Drawings

M-147, page 12, Test Equipment Drawing List,

Variable Frequency Clock Pulse Generator

M-147, page 13, Test Equipment Drawing List,

Restorer Pulse Generator

INTRODUCTION

Volumes 5 and 6 of this report describe the Whirlwind I computer in block diagram form and indicate the operations which must be performed in the computer. Volumes 15 through 19 describe the development of components and circuits necessary to the performance of these operations. This volume of photographs, circuit schematics, layouts, and mechanical drawings shows the progress which has so far been made in the synthesis of components and circuits into a working electronic system which will satisfy the demands of the block diagram.

To help in relating the circuits to the block diagrams, the drawing lists include, in addition to the drawing title and number, the number which describes the pertinent part of the system in the block diagrams. Consistent with this, the system drawings are presented in five groups headed respectively: System, Control, Storage, Arithmetic Element, and Registers, a sixth group being drawings of test equipment designed and built by this laboratory. The test equipment is described in Vol. 19, E-48, and E-52.

The correspondence between block diagrams and system drawings is not complete, because the requirements of video cabling and construction methods dictate a physical arrangement somewhat different from that indicated by the purely functional block diagrams. Differences will become apparent from a comparison of the block diagram drawings C-37070 and C-37071 in the System group, with the video cabling drawing E-30905 of E-68. All units in the latter bear the same reference numbers as are used in the block diagrams but the arrangement is different. In the block diagrams we find, in general, that a register is treated as a unit, whereas construction follows a digit-by-digit pattern, and one digit of each of several registers may be located on a panel. Assembly drawing R-30797 in the Register group, carries a digit of the program counter, block diagram reference 102, a digit of the program register 103, and a digit of the check register 601.

The System group of drawings includes a block diagram list, two block diagrams and reference to two drawings which appear as a part of the following engineering memorandum. E-68 is a discussion of preliminary Whirlwind I cabling and a proposed physical arrangement of the whole system. E-53 is an estimate of power consumption of the system but is not based on the latest tube estimate given in Vol. 16, M-132.

In the Control group are given, among other things, the block schematics, circuit schematics, and assembly drawings of the program

counter, 102, and the program register, 103. These two assemblies are part of the register panel for which a Panel and Cable Plan, drawing R-30797 is given in the Register group.

The Storage drawings describe the test storage consisting of toggle switches and flip-flops, but do not include anything on electrostatic storage described in Vols. 9 and 10. The addition of electrostatic storage and its attendant circuits to the system, entails only modification of the storage switch and control matrix. A photograph of a storage switch is included in the drawings.

The drawings and photographs headed Arithmetic Element are descriptive of the five-digit multiplier now in operation. This was initially operated at a 100 kc pulse repetition frequency on October 28, 1947, and is now operating at 2 megacycles. Photographs of the multiplier and its controls are typical of the type of construction which will be used in Whirlwind I. The frontispiece of this volume indicates the type of cabinets to be used. The Whirlwind I arithmetic element will be a redesign of this multiplier based on experience gained from it. There will be a considerable extension of the arithmetic element control beyond the somewhat limited capabilities of the multiplier control.

The elements whose status is given in the following summary are subject to certain modifications and revisions not specifically mentioned in the summary. The change from the 6AS6 gate tube to the SR-1030 described in Vol. 16 may eliminate some tubes with attendant revisions of circuits and layouts. Pulse width and resultant duty factor may be modified and call for a revision in the value of some of the circuit components. Checking methods not yet fully investigated may require the addition of some gate tubes, control lines, and bus connections not now included in the system, see Vol. 7, M-127. References are to further descriptions of the various elements. For a time schedule, see Vol. 1, drawing B-31202.

- | | |
|----------------------|---|
| 101 Master Clock | - All components constructed and in use in 5-digit multiplier. Not packaged in one unit for WWI. Vol. 19, E-48, E-52. |
| 102 Program Counter | - Preliminary model constructed. Vol. 19, E-55, M-105. |
| 103 Program Register | - Preliminary model constructed. Vol. 19, E-55, M-105. |
| 104 Control Switch | - Preliminary model constructed and nearly satisfactory in operation. Vol. 17, R-123. |
| 105 Operation Matrix | - Design data available based on 104 above. Not yet laid out. |

106	Time Pulse Distributor	- Constructed by Sylvania and operating satisfactorily.
107	Operation Timing Matrix	- Design data available based on 104 above. Not yet laid out.
108	Program Timing Matrix	- Design data available based on 104 above. Not yet laid out.
200	Storage Arrangement	- Block and Circuit schematics complete. Details below.
201	Storage Switch	- Same as control switch, 104.
203	Flip-flop Storage	- Under construction, Vol. 19, E-63.
301	A Register)	
)	
302	Accumulator)	- Operating in 5-digit multiplier.
)	
303	B Register)	
)	
305	Step Counter	- Operating in 5-digit multiplier. Expand from 3 to 5 stages for WWI. Vol. 19, R-126.
601	Check Register	- Preliminary model constructed. Vol. 19, E-55, M-105.

11. Section 312(b)(3) amended:

<u>REF.</u>	<u>VOL.</u>	<u>REF.</u>	<u>VOL.</u>	<u>REF.</u>	<u>VOL.</u>
M-32	8	M-95	8	M-133	18
M-46	9	M-96	9	M-134	7
M-56	9	M-99	15	M-135	7
M-58	15	M-100	8	M-136	7
M-61	8	M-101	11	M-137	7
M-62	4	M-103	16	M-138	15
M-63	4	M-105	19	M-140	4
M-64	4	M-106	11	M-141	7
M-65	14	M-107	19	M-143	8
M-66	4	M-109	16	M-144	9
M-68	16	M-110	15	M-145	10
M-69	4	M-111	7	M-146	12
M-71	8	M-112	9	M-148	12
M-72	16	M-113	7	M-147	15
M-74	14	M-114	19	M-148	14
M-76	4	M-116	16	M-149	15
M-77	15	M-117	7	M-150	16
M-78	8	M-118	16	M-151	17
M-80	16	M-119	16	M-152	18
M-81	16	M-121	9	M-153	19
M-82	16	M-123	7	M-154	20
M-83	16	M-124	8	M-155	21
M-85	14	M-127	7	M-156	22
M-89	11	M-128	16	M-157	11
M-91	15	M-129	7	M-158	7
M-92	15	M-130	9	M-159	9
M-94	8	M-131	16	M-160	8
		M-132	16	M-161	7

REF ID: A68123

B Series Memoranda

C Series Memoranda

<u>REF.</u>	<u>VOL.</u>	<u>REF.</u>	<u>VOL.</u>
E-7	14	E-52	19
E-24	7	E-53	13
E-31	10	E-54	19
E-32	10	E-55	19
E-33	19	E-56	15
E-37	15	E-57	16
E-38	19	E-58	19
E-39	15	E-59	19
E-41	15	E-60	19
E-42	15	E-61	16
E-44	19	E-63	19
E-45	19	E-64	15
E-47	15	E-68	13
E-48	19	E-69	15
E-49	19	E-71	19
E-50	16	E-73	16

C-15 14

REFERENCE INDEX

R Series Memorandums

<u>REF.</u>	<u>VOL.</u>	<u>REF.</u>	<u>VOL.</u>
R-36	14	R-115	4
R-49	14	R-116	4
R-63	14	R-117	16
R-64	3	R-118	16
R-89	19	R-120	10
R-90	4	R-121	19
R-94	14	R-122	18
R-98	14	R-123	17
R-100	14	R-124	11
R-103	14	R-125	14
R-104	16	R-126	19
R-106	15	R-127	5
R-108	15	R-127	6
R-109	19	R-128	10
R-110	9	R-129	12
R-111	15	R-130	9
R-113	15	R-131	10
R-114	8	R-132	10

M-147

- 6 -

SYSTEM DRAWING LIST

Summary List of Block Diagrams	B-37079
System Block Diagram	C-37071
Bus Connections	B-37070

Following drawings for reference only. They are included in E-68.

Preliminary Video Cable and Panel Arrangement	E-30905
---	---------

Proposed Arrangement Whirlwind I Installation	D-31016
---	---------

B-37079-1

TITLE		DWG. NO.	COD
System Block Diagram		C-37071-1	10
Bus Connections		B-37070-1	10
Control Functions		B-37073-1	10
Control		B-37098	10
Timing Diagram	Operation ad	B-37080	10
Timing Diagram	Operation ca	B-37081	10
Timing Diagram	Operation su	B-37082	10
Timing Diagram	Operation cs	B-37083	10
Timing Diagram	Operation mr	B-37084	10
Timing Diagram	Operation mh	B-37085	10
Timing Diagram	Operation ts	B-37086	10
Timing Diagram	Operation sd	B-37087	20
Timing Diagram	Operation sr	B-37088	20
Timing Diagram	Operation sl	B-37089	20
Timing Diagram	Operation sp	B-37090	20
Timing Diagram	Operation cp	B-37091	20
Timing Diagram	Operation td	B-37092	30
Timing Diagram	Operation sa	B-37093	30
Timing Diagram	Operation dv	B-37094	30
			30
Summary List of Block Diagrams		B-37079-1	30
Parallel Dicit Computer Codes		B-37001-1	60

CODE NO.	TITLE	DWG. NO.		
101	Master Clock	B-37058-1		
102	Program Counter	B-37062		
103	Program Register	B-37067		
104	Control Switch	B-37066		
105	Operation Matrix Part I General	C-37077		
105	Operation Matrix Part II Arithmetic Element	C-37078		
106	Time Pulse Distributor and Control	B-37076 B-37068		
107	Operation Timing Matrix Part I	C-37077		
107	Operation Timing Matrix Part II	C-37078		
108	Program Timing Matrix	B-37075		
109	Repeat Switch - (Removed from System)	B-37059		
200	Storage Chassis Arrangement	C-37064-1		
201	Storage Switch	B-37066		
203	Flip-Flop Storage Section	B-37057		
203	Storage Output Section	B-37060		
203	Flip-Flop Storage Control	B-37061-1		
300	Arithmetic Element	C-37072-1		
301	Section of A-Register	B-37056 C-37096 C-37063		
302	Accumulator Sections	B-37097-1 B-37069		
303	B-Register Sections			
304	Step Counter	B-37074-1		
601	Check Register	B-37065		

RESEARCH LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

SUMMARY LIST OF BLOCK DIAGRAMS WWI

FES 4/18/47

B-37079-2

2

Y SWEEP TRIGGER

00
AM CONTROL
S MATRIX
7075

READ IN TRIGGER

* PROGRAM STORAGE CONTROL
* PROGRAM REGISTER CONTROL
* OPERATION STORAGE CONTROL

103
PROGRAM REGISTER
DWG. B-37067

200
STORAGE
DWG. C-37064

500
OUTPUT
& DISPLAY

CHECK REGISTER BUS

BUS

* STEP COUNTER CONTROL

300
ARITHMETIC ELEMENT
DWG. C-37072

601
CHECK REGISTER
DWG. B-37065

CLEAR A-REGISTER

* ARITHMETIC ELEMENT CONTROL

BUS TO CHECK REGISTER

TRANSFER CHECK

CHANGE CONTROL

ALARM

CLEAR

RESTART

* NOTE:
SEE B-37073

STEP COUNTER END GARRY

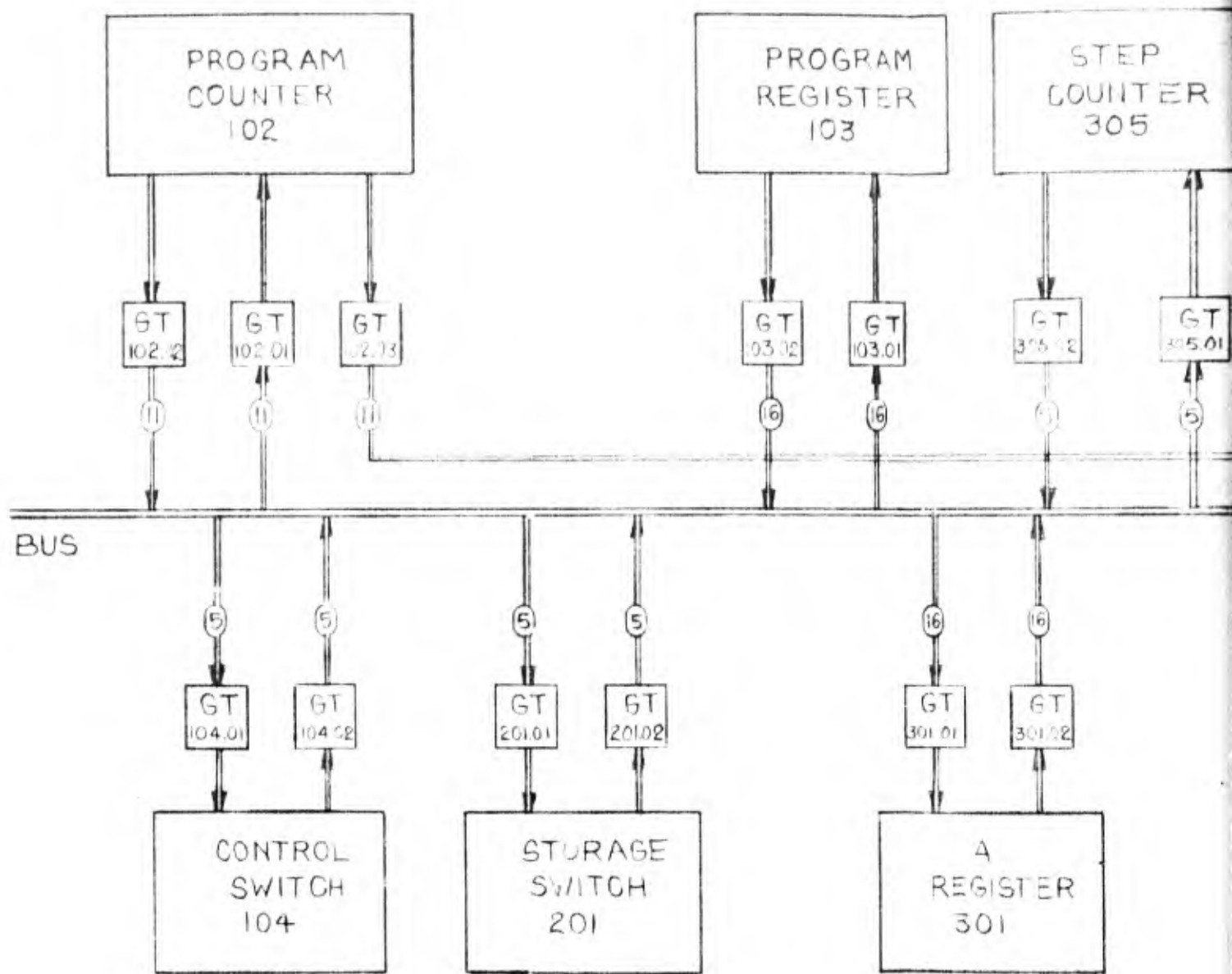
RESTART

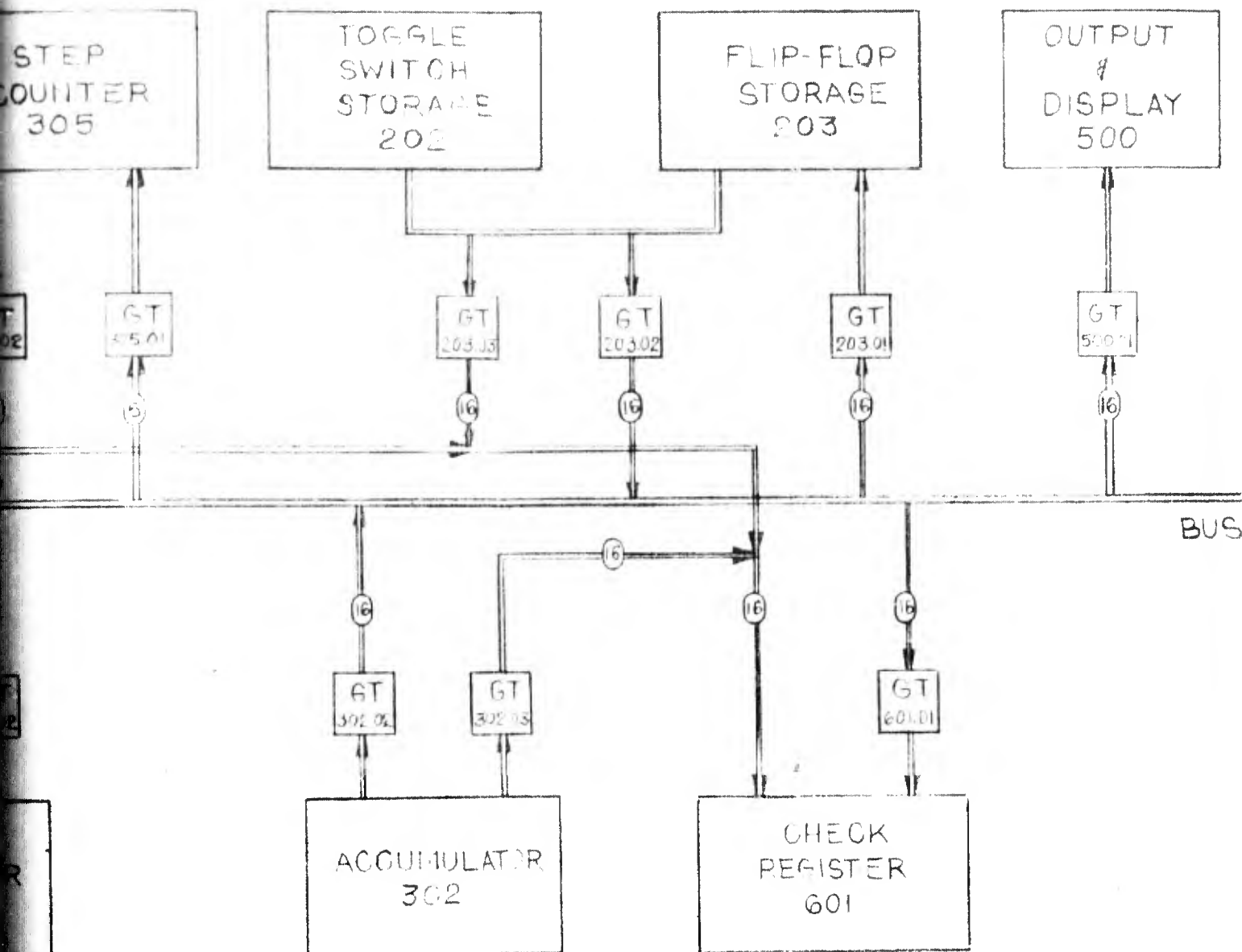
LOW FREQ. TIME PULSES

HIGH FREQ. TIME PULSES

SERVOMECHANISMS LABORATORY OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345			
SYSTEM BLOCK DIAGRAM WWI			
SCALE:	DR. FZ WOLSKY 4-23-41		C-37071-2
DWG. JBS	CR.	APP.	

2





SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6-3-45

BUS CONNECTIONS WW I

SCALE:

DR.

W 14-3-31-4

ENG

CK.

APP.

B-37070

2

Project Whirlwind
Servomechanisms Laboratory
Massachusetts Institute of Technology
Cambridge, Massachusetts

SUBJECT: WHIRLWIND I CABLES AND INSTALLATION

To: 6345 Engineers, Sylvania (3)

From: H. Palmeslock

Date: October 10, 1947

Burnished herewith are two drawings: one, a Preliminary Video Cable and Panel Arrangement, the other a Proposed Arrangement Whirlwind I Installation. It is to be clearly understood that these are for information purposes only to assist you in visualizing the complete computer and to act as a guide in making plans and designs. It is not expected that revisions or alterations will be widely or frequently distributed except to those immediately concerned with certain aspects of the design. It has been decided that Whirlwind I should be so packaged that every component and connection should be available for test without shutting down any part of the computer. The result is a much larger package than would otherwise be the case.

DRAWING NO. E-30905 - This drawing is intended primarily to show the approximate number of units in the computer and to give an idea of the interconnecting cables involved. No attempt has been made to make the number of cables very accurate and they will be subject to change as the control functions develop. No detailed work has been done on electrostatic storage control so these connections are omitted entirely. Input and Output Registers are grouped in one box. Their number or size is not yet determined. They may be attached to the register panels or they may become a separate row of panels. Film Readers and Writers and Binary to Decimal Converters are similarly grouped in a box on the diagram. They will require control lines not shown and will probably be large boxes of equipment rather than rows of panels.

Three rows of panels are shown together with tentative dimensions. The 26" width has been decided on. The vertical dimension for the panel contents as shown is probably within 30% of final design. The driver panels will probably be the same size as the digit panels. No layout has been done on the control panels but some of them, in particular the matrices, will be considerably larger than the other panels. No design has been done on the Operator's Console and this drawing merely indicates connections and what may go in it.

DRAWING NO. D-31016 - This proposed arrangement of Whirlwind I is to be interpreted as one of many ways in which the panels shown on the previous drawing might be fitted into the available space with reasonable cabling symmetry. A double floor is assumed. Air ducts run transversely and feed each cabinet individually. Signal and check busses run fore and aft under the floor; control lines run transversely under the floor between the two sections of a register. In general in the register, each cabinet holds a single digit of each of several registers. The ninth cabinet from the right-hand side holds the control gate drivers. The space assigned to Input and Output Registers is very nebulous. They may be included in the Register Panels. The possible addition of some registers under consideration may require another full row of cabinets. Space for the Control, including the Timing Matrices is a rather rough estimate.

Harry Fahnestock

H. Fahnestock

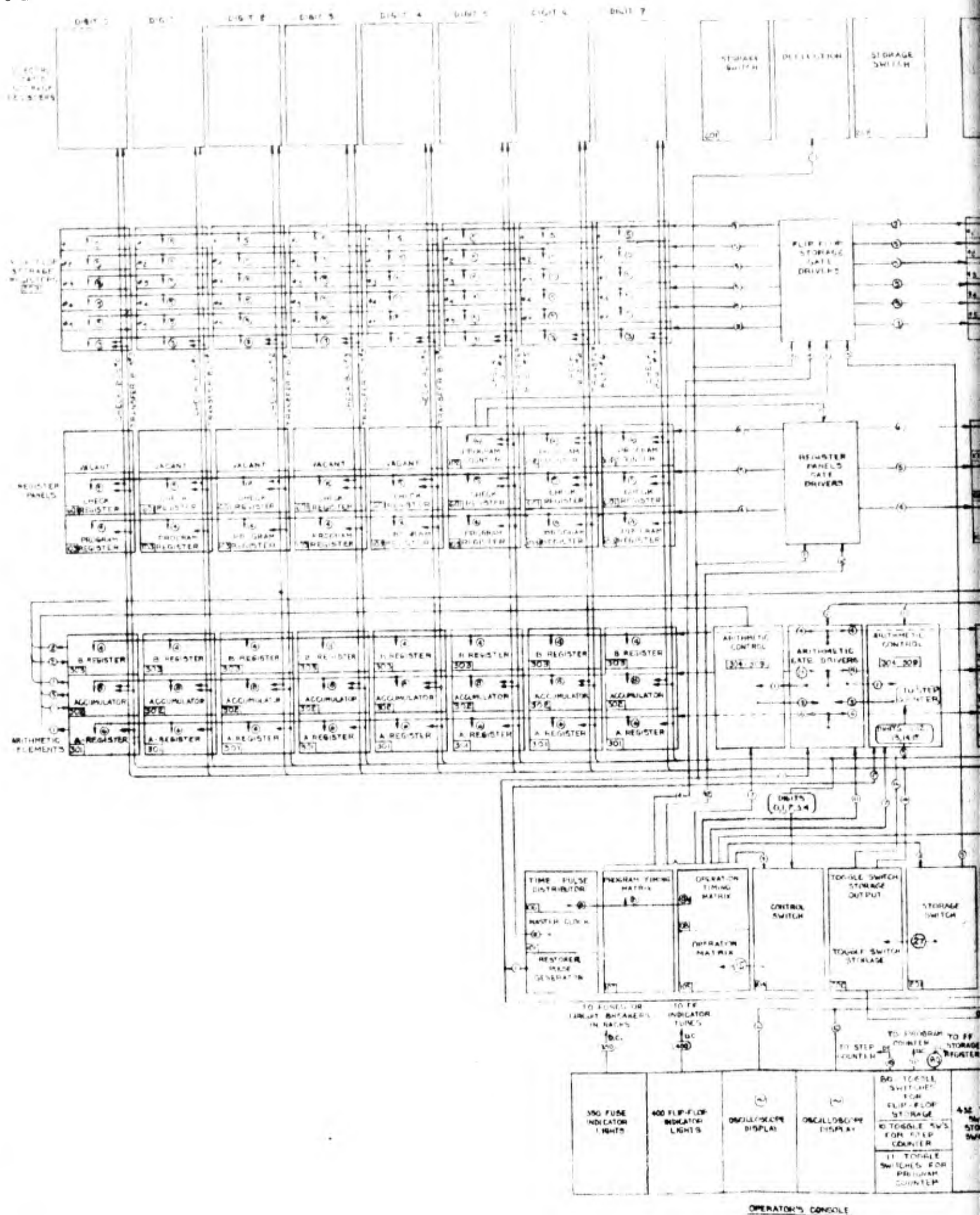
LIST OF DRAWINGS:

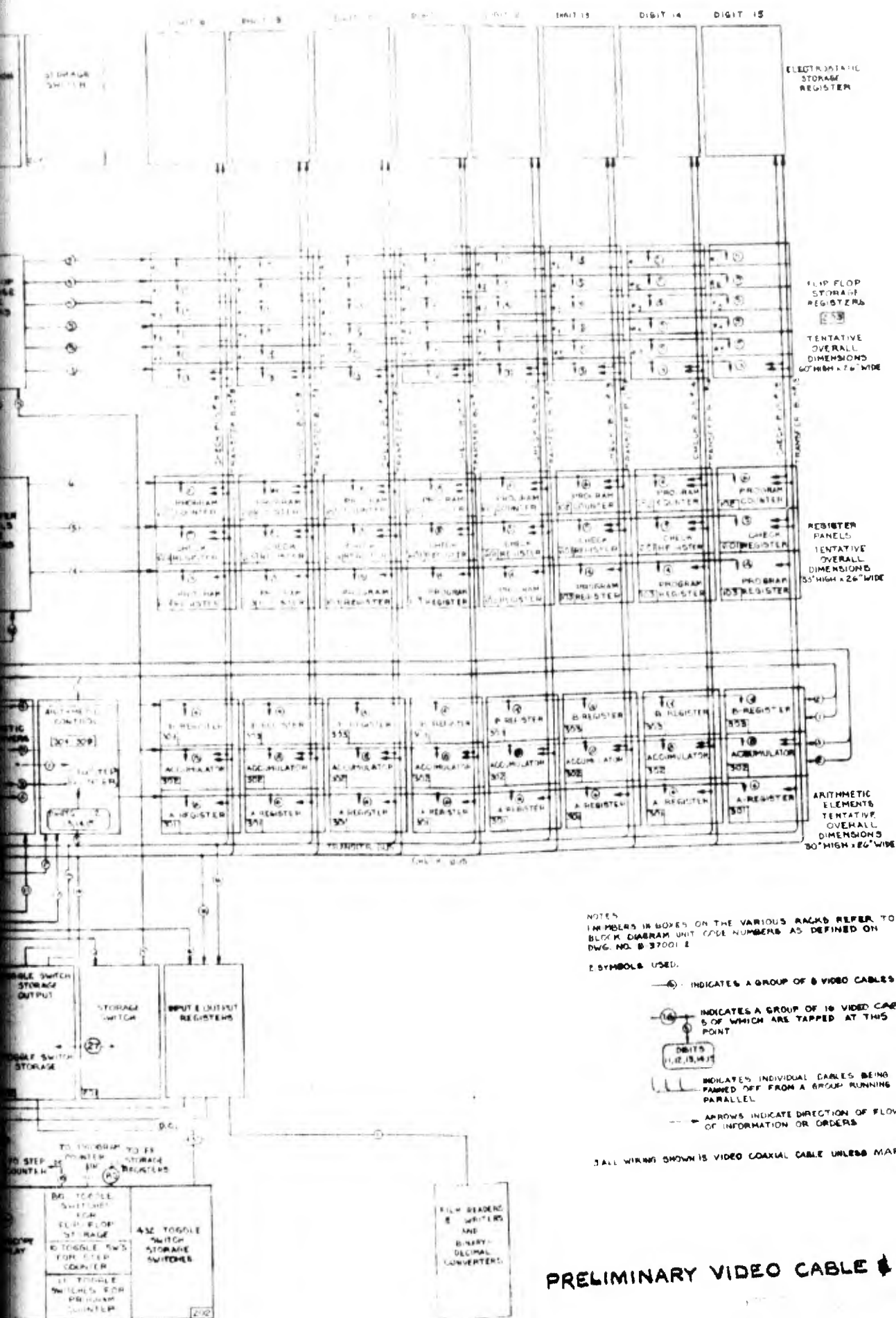
E-30905

D-31016

HF:has

E-30905





PRELIMINARY VIDEO CABLE & PANEL ARRANGEMENT

6345

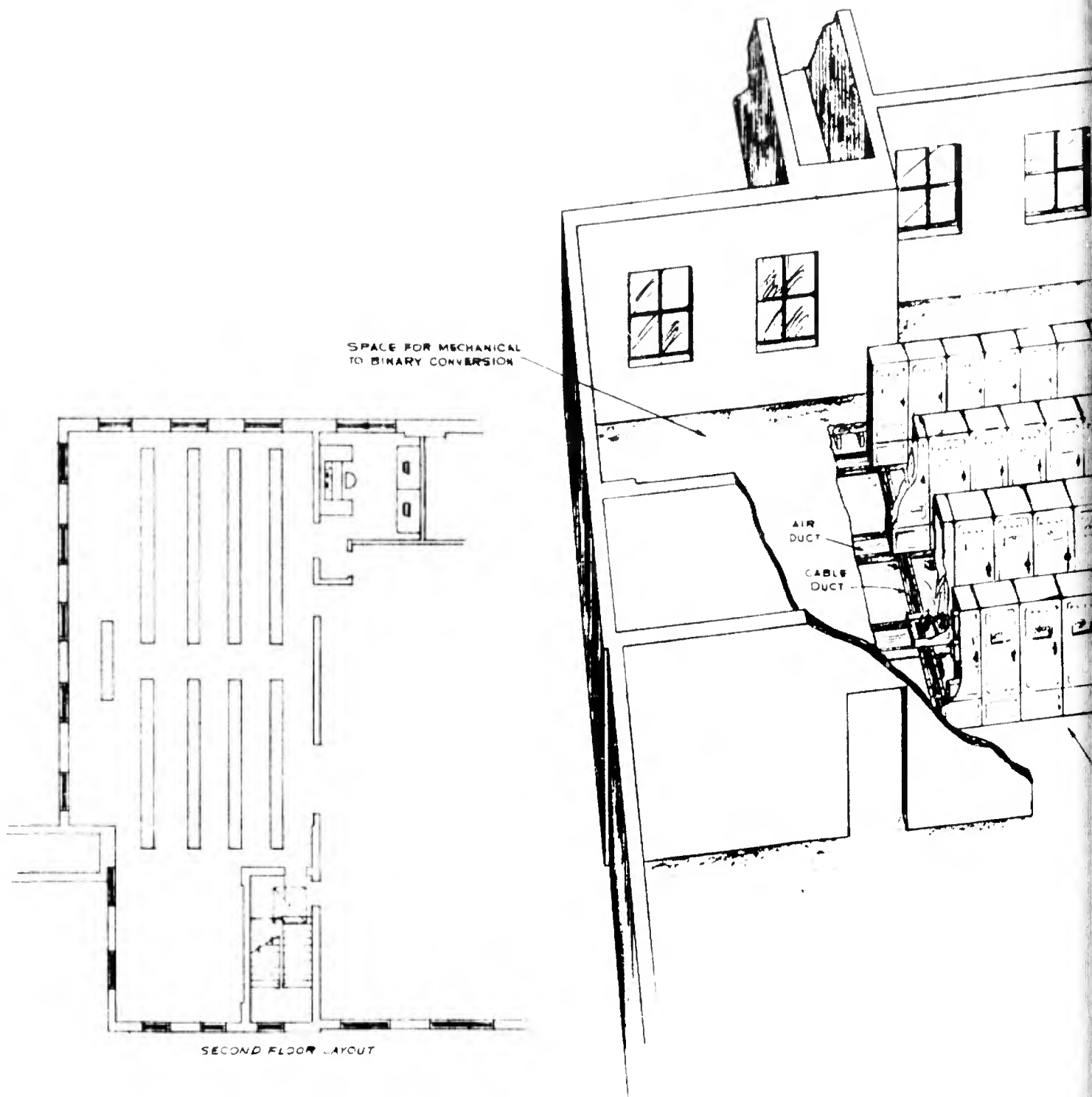
C.W.W.
10-9-47

F. WOLSKY
10/9/47

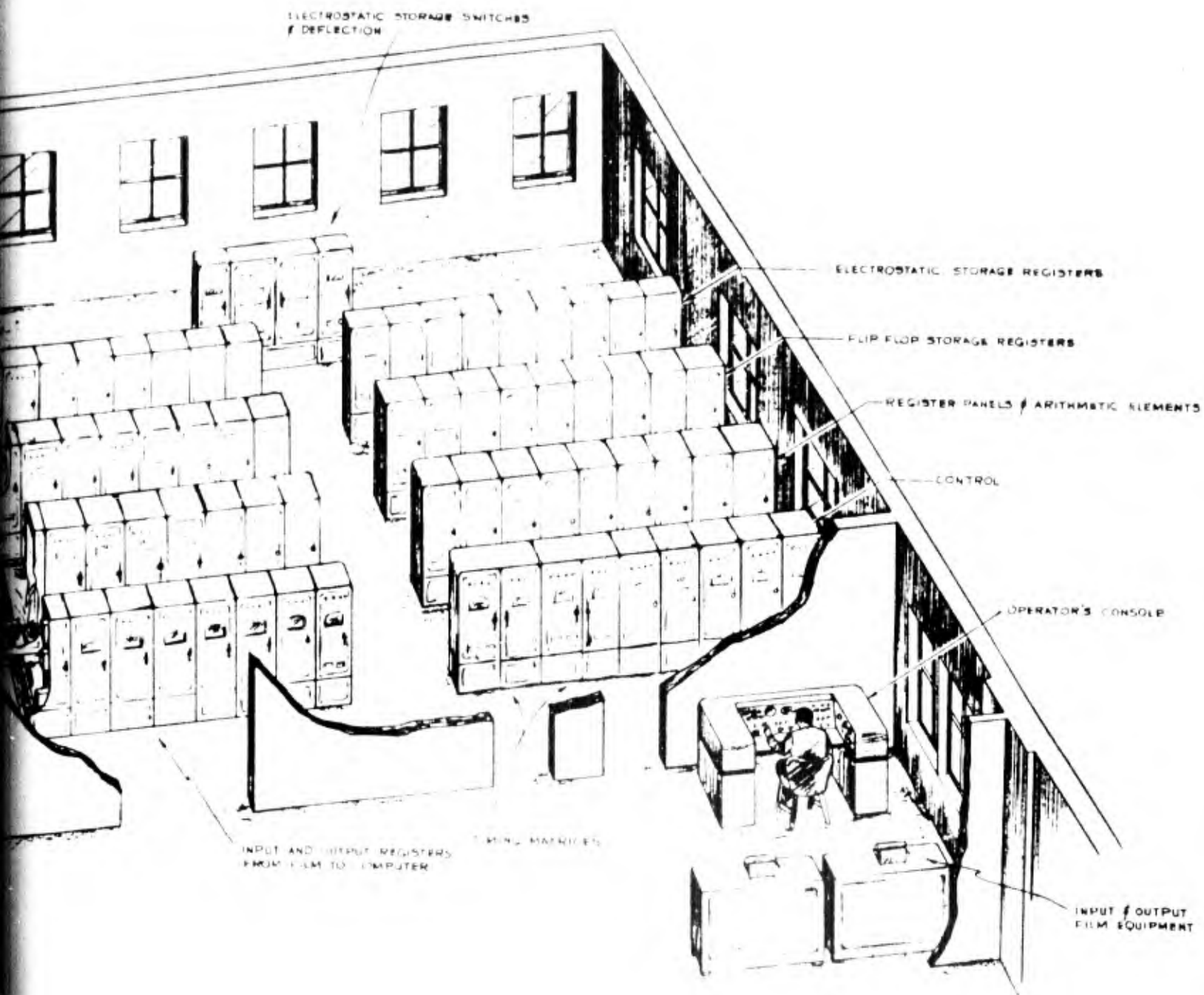
C.W.W.
10-9-47

E-30905

B REDUCTION



PROPOSED A
WHIRLWIND I



PROPOSED ARRANGEMENT
WHIRLWIND I INSTALLATION

6445	6/1/47	6/1/47
6445	6/1/47	6/1/47
6445	6/1/47	6/1/47

B REDUCTION

2

CONFIDENTIAL REPORT NO. 100

TO: Engineers of Project 6345

Page 1 of 2 pages

FROM: Harris Fahnestock

SUBJECT: WVI Power Estimation

DATE: August 8, 1947

A power estimate has been made for WVI and is summarized in the table below and itemized hereafter. No account has been taken of input and output devices. Filament transformer losses are included in each unit. Other power supplies and their losses are not included. Estimates are based on current circuit schematics and block schematic. Estimates for electro static storage are less accurate than others as they are shown separately in the summary.

SUMMARY

UNIT	NO. REQ	UNIT POWER	TOTAL
Arith. EL.,) CR, PR, PC)	16	370	5900
EF storage	16	168	2700
Register Drivers	1	770	800
Control	1	2000	2000
WVI loss in., out., E.S. stor.			11500
E.S. Stor. Reg.	16	500	8000
Deflection	1	5000	5000
E.S. storage			15000
WVI loss input and output		25 KW	

Estimates include filament transformer losses of 20% of filament power. The power estimates are conservative with respect to duty cycle.

1	EF	:	2-6AG7's	15	watts
1	TR	:	1-6AG7	5	
1	GT	:	1-6AS6	2	
1	BA	:	1-6AG7	6	
1	BA	:	1-829	15	

100
 100/100 11 100 100 100

Arithmetic element	1 digit	2000
CR. 100 100	1 digit	100
5 100 registers	1 digit	100
Register drivers		300
Arithmetic element drivers		300
2 100 position switches		1000
Time pulse distributor		400
Timing matrix		100
Clock		50
Step counter		100
Control contingencies		200

H. F. Waf

Harrie Fahnstock

HFwaf

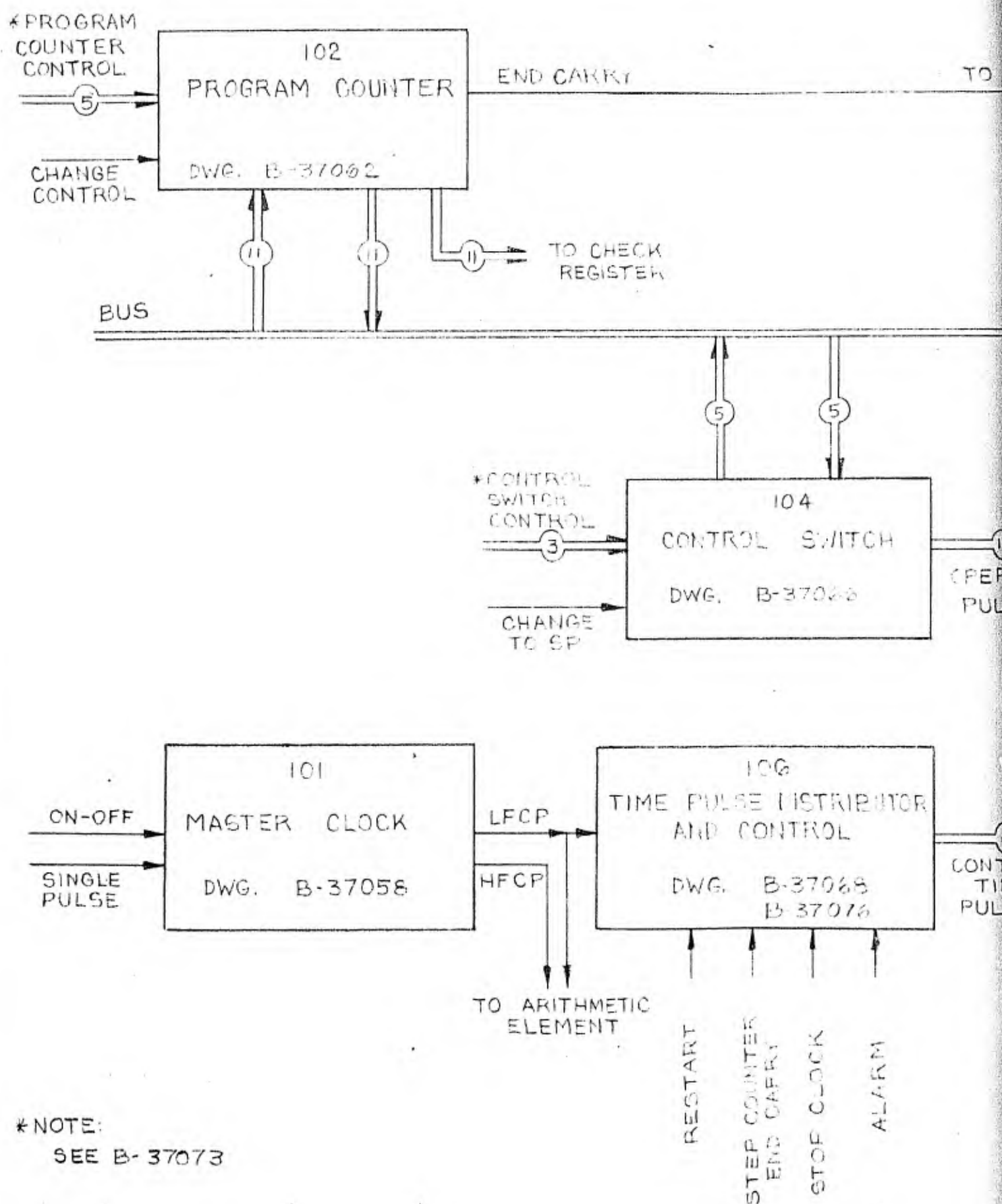
M-147

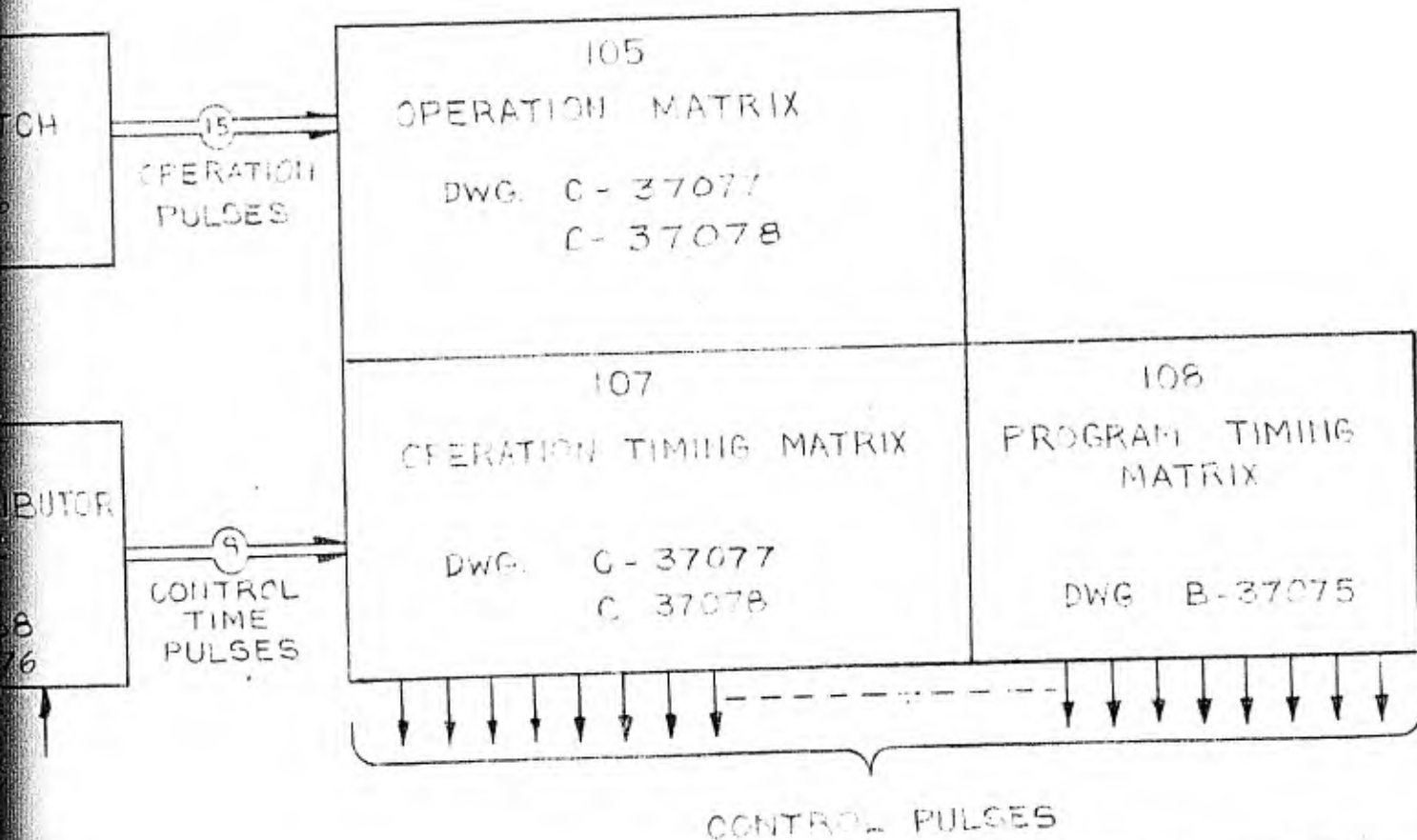
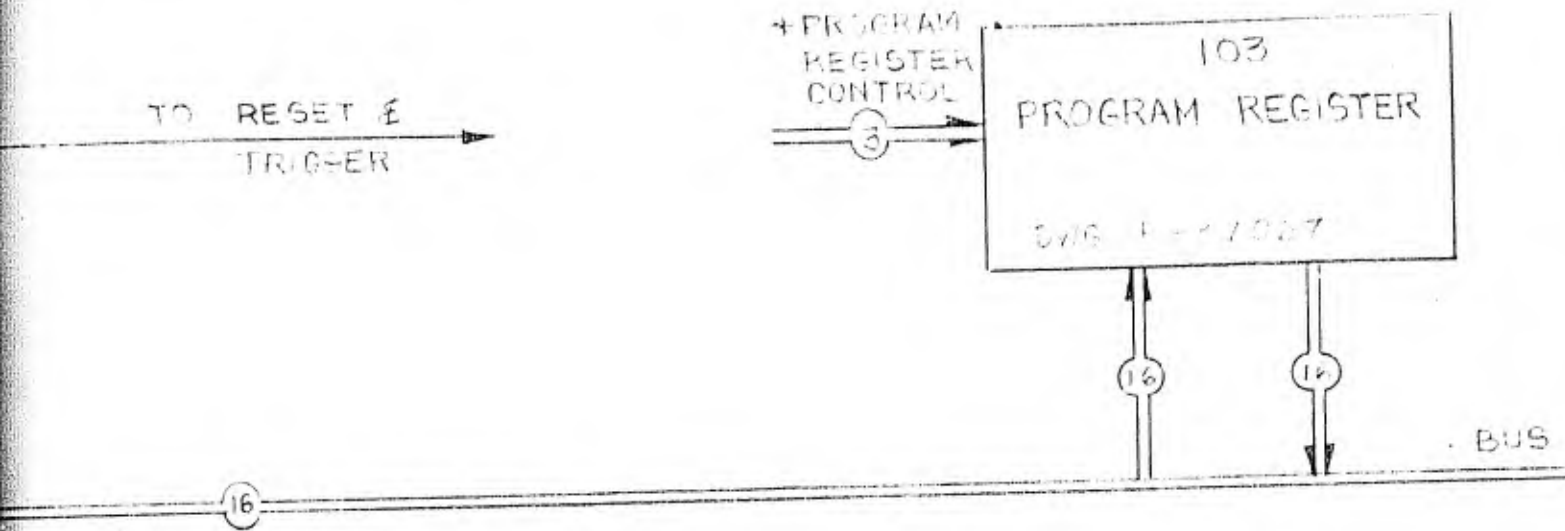
- 7 -

CONTROL DRAWING LIST
(Block Diagram Reference 100)

Block Diagram	B-37098
102 Program Counter	
Block Schematic	SB-39291
Circuit Schematic	SD-39284
Assembly	D-30800
103 Program Register	
Block Schematic	SB-39239
Circuit Schematic	SD-39283
Assembly	D-30799
104 Control Switch	
Block Schematic	D-30672
Photograph	FB-279
106 Time Pulse Distributor	SB-39447

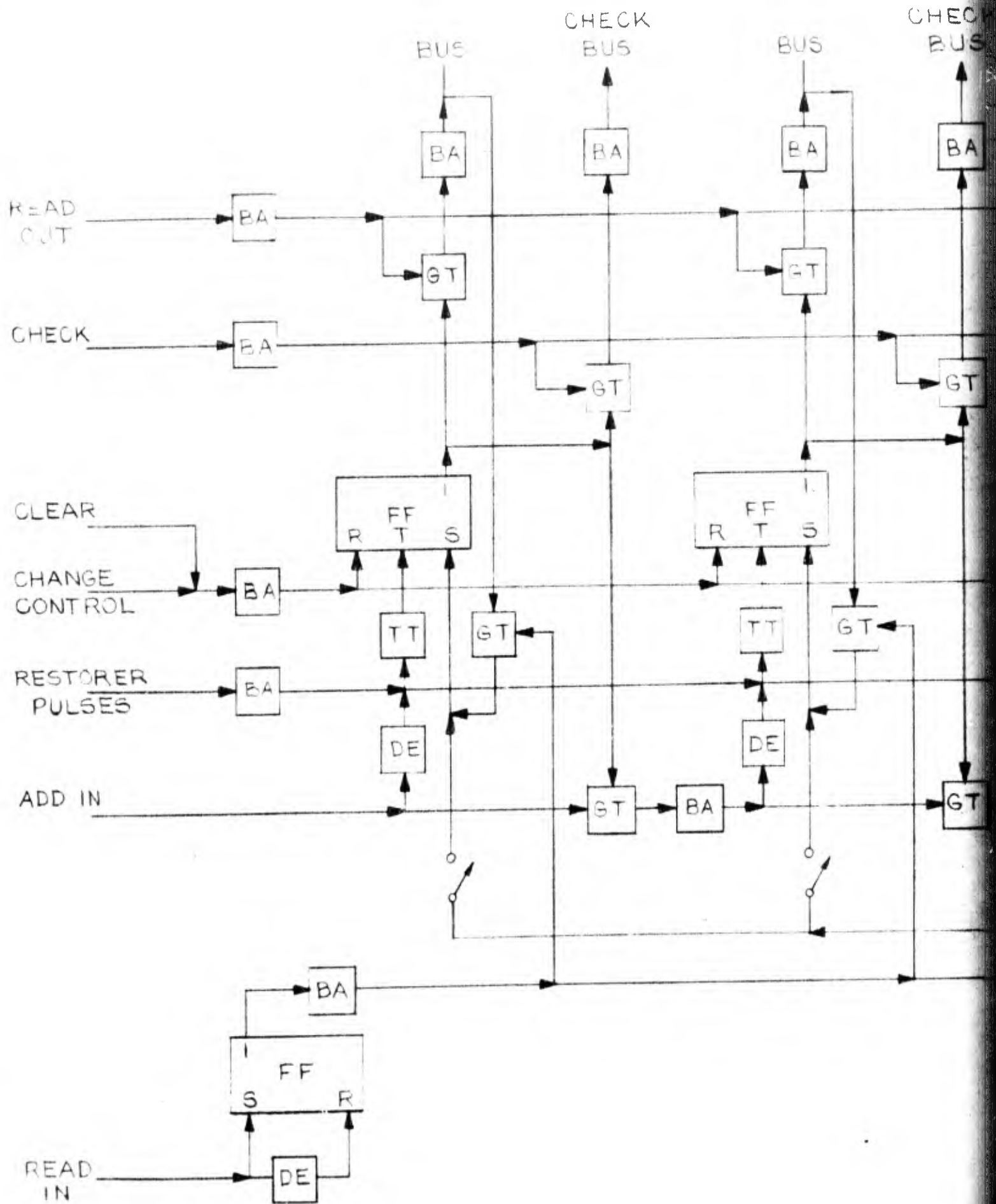
B-37008-1

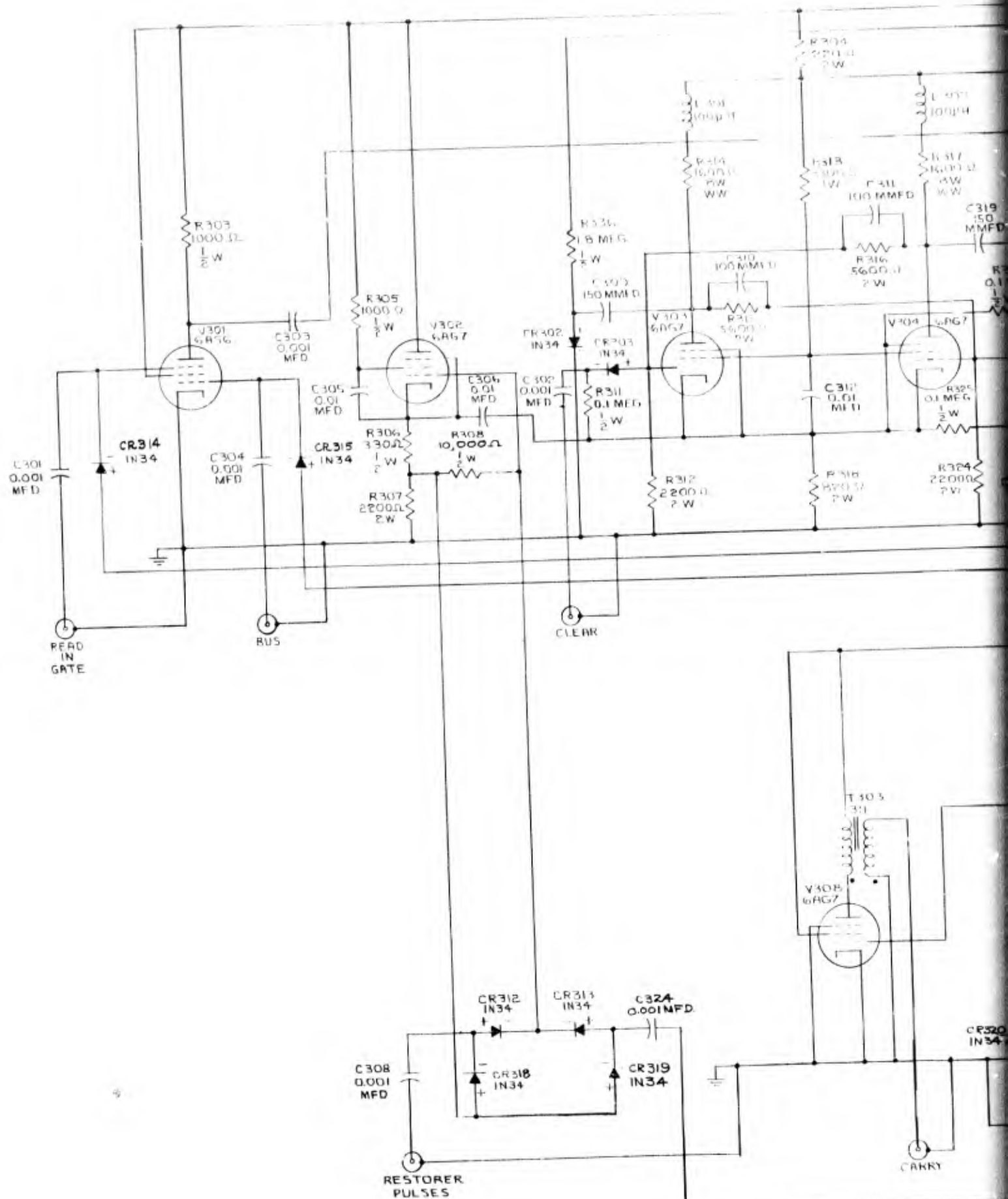


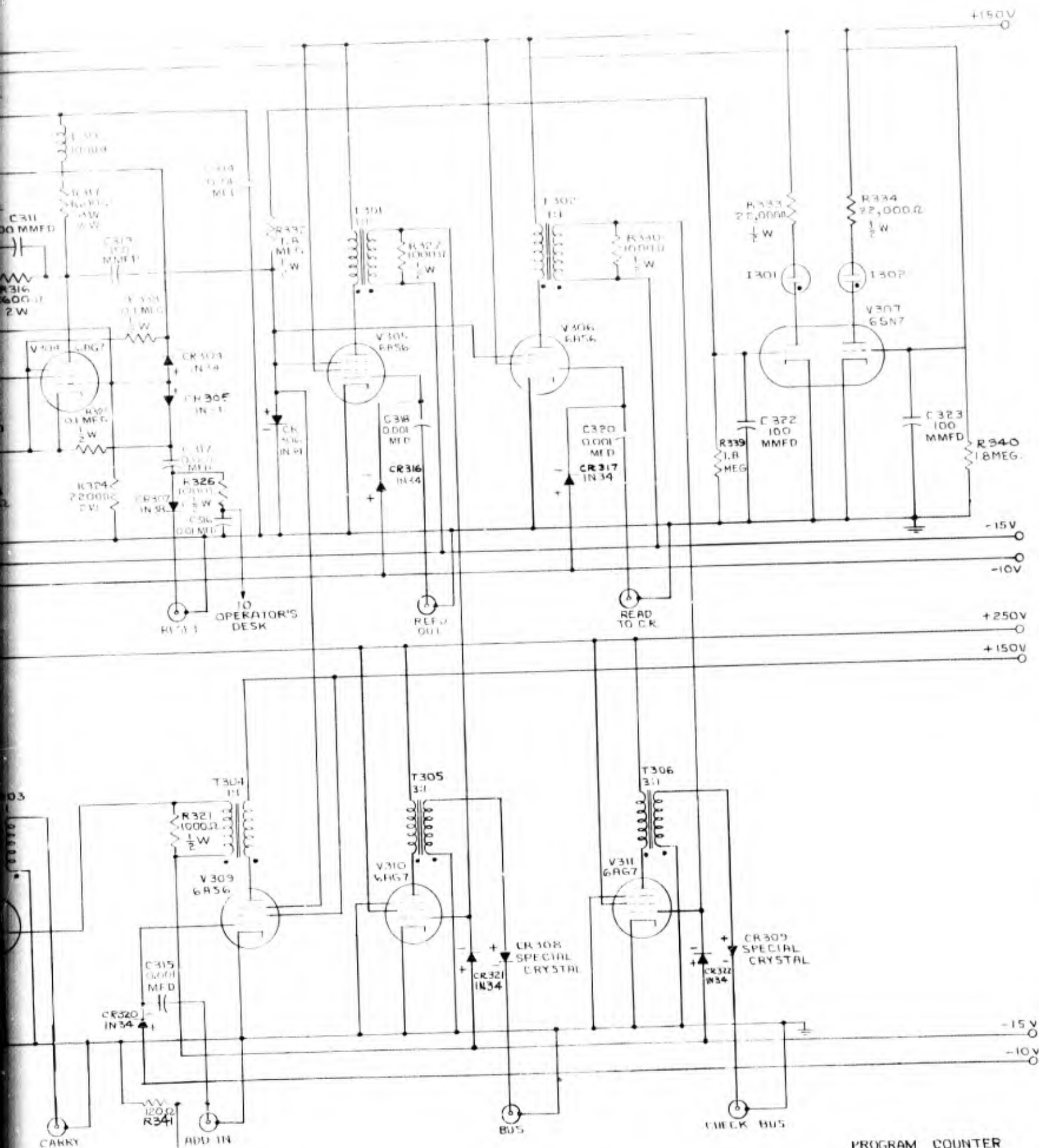


ALARM

SERVOMECHANISMS LABORATORY OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345			
CONTROL		WWI	100
SCALE:	DR. <i>Flanagan</i> 5-5-47	B-37098-1	
ENG. <i>JES 5/5/47</i>	CK.		

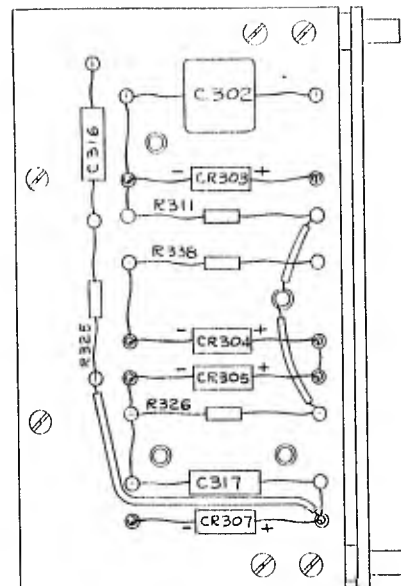
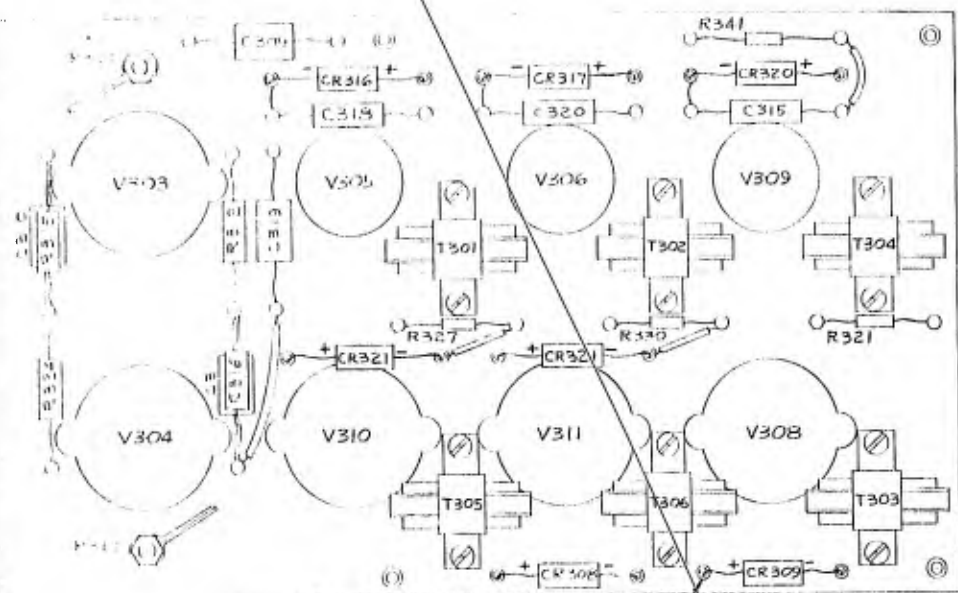






PROGRAM COUNTER
CIRCUIT SCHEMATIC

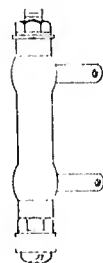
6315	8111
6315	SD-33284-3



(3) SOLDER ALL CRYSTAL PIGTAILS INTO LUG AS SHOWN.

NOTES

1. V301, V302, V303, V304, V305, V306, V307, V308, V309, V310, & V311 ARE NOT PARTS OF THIS ASSEMBLY & ARE INDICATED FOR REFERENCE ONLY.



5

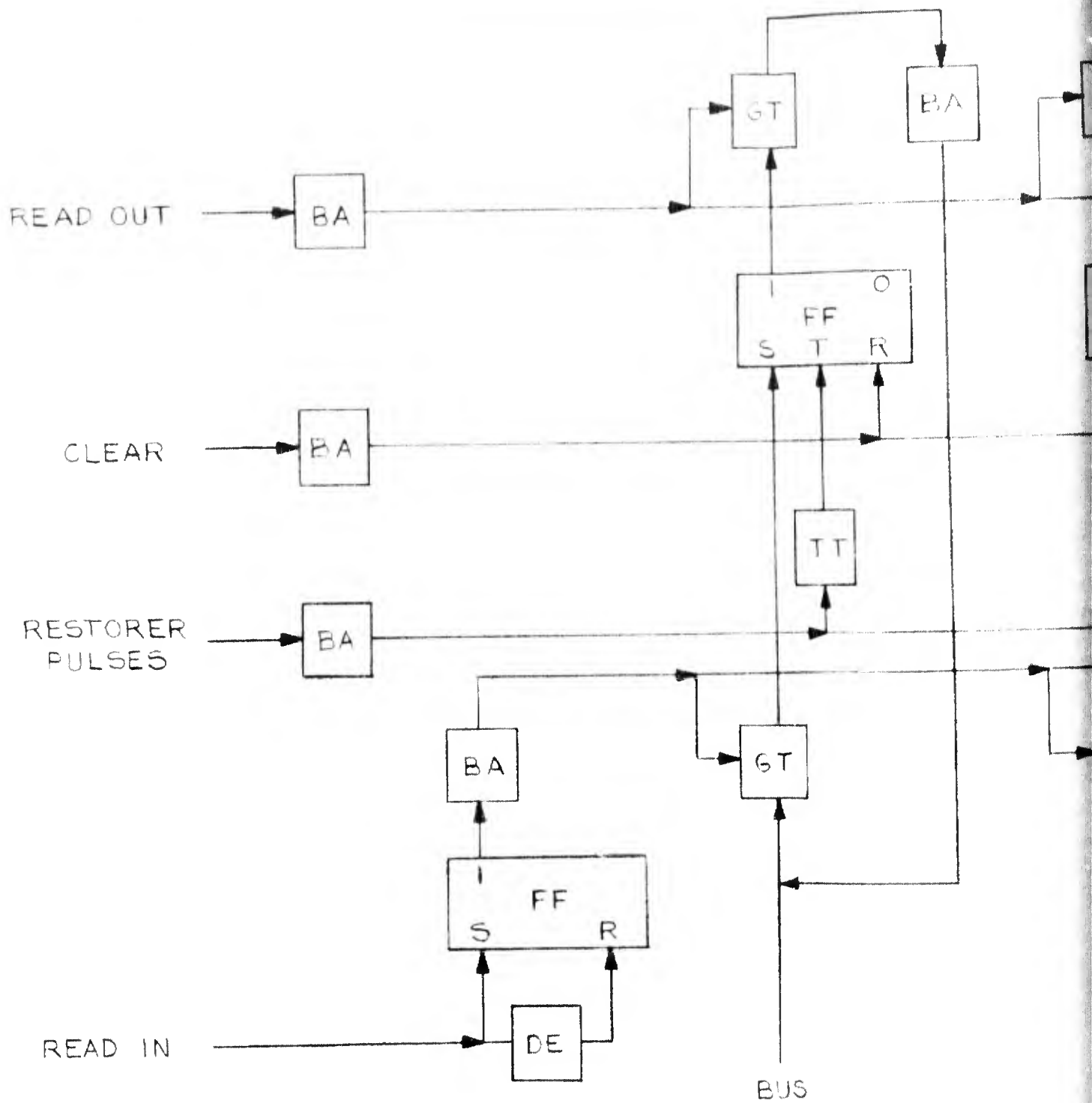
4

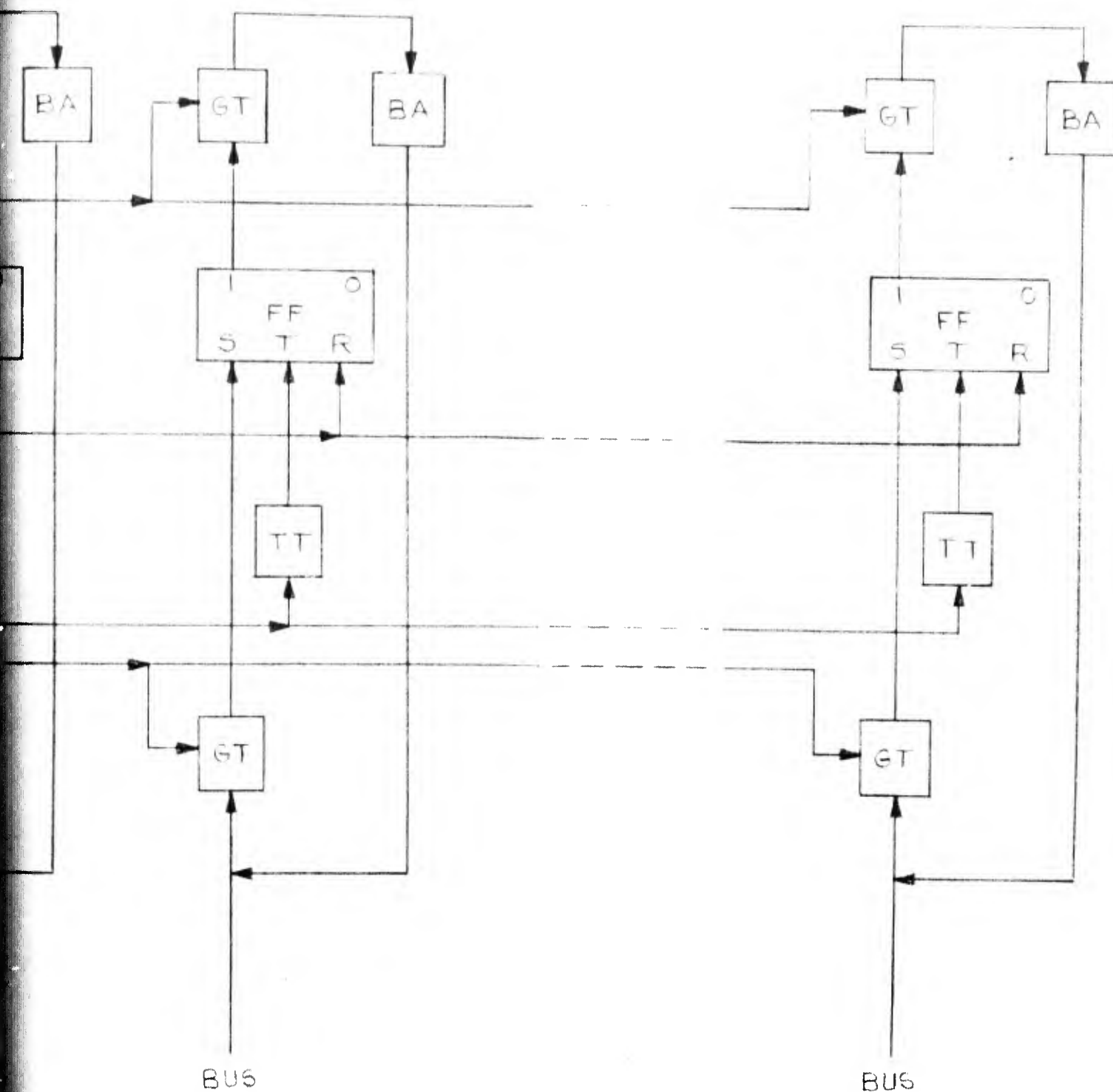
ITEM	DESCRIPTION	PART NO.	QUAN.
3	CAMBRIC SLEEVING		2
8	INDICATOR KELLOG	*49	2
7	PANEL MOUNTING POST	A-30754	2
6	TURRET LUG SINGLE	CTC #1724D	78
5	MOUNTING POST	CTC #1246D	8
4	CLINCH NUT	#22C5-62	12
3	TURRET LUG HOLLOW	CTC #1558D	38
2	TURRET LUG DOUBLE	CTC #1081A	4
1	INDICATOR MTG PLATE	A-30752	1

G					
F					
E					
D					
C					
B					
A					
WAS	APP.	DATE	TE.	CK.	

SERVICE ENGINEERING LABORATORY OF THE
 MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 DIVISION OF INDUSTRIAL COOPERATION PROJECT 12-6345
 PROGRAM COUNTER ADJ.
 SCALE: FULL DR. 6/11/41
 D-30600-1

2-3-323

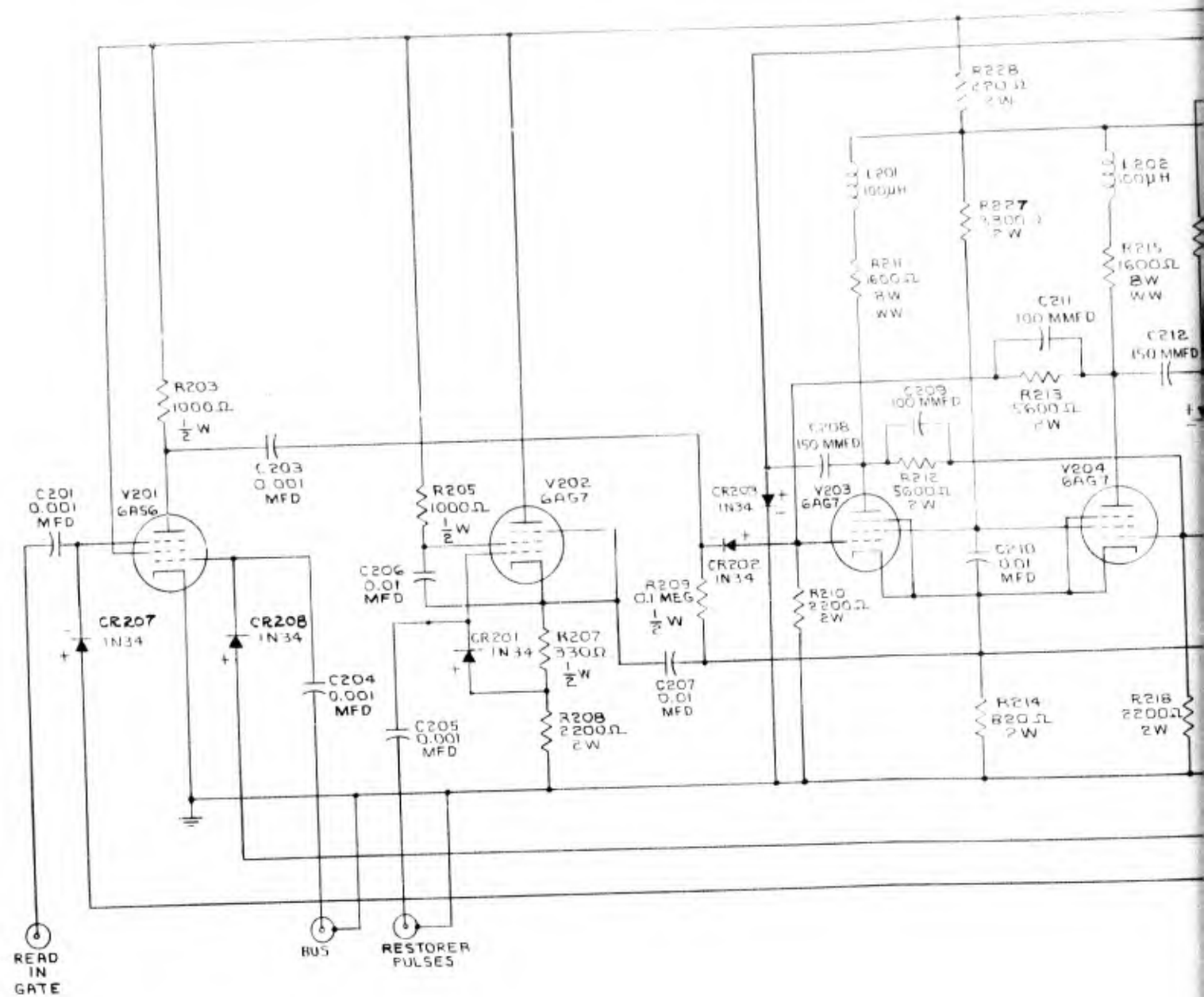




SERVOMECHANISMS LABOPATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

PROGRAM REGISTER BLOCK SCHEMATIC

SCALE:	DR. F. WOLSKI 10-22-47		B-39289
ENG. <i>D.P.B.</i>	CK.	APP.	



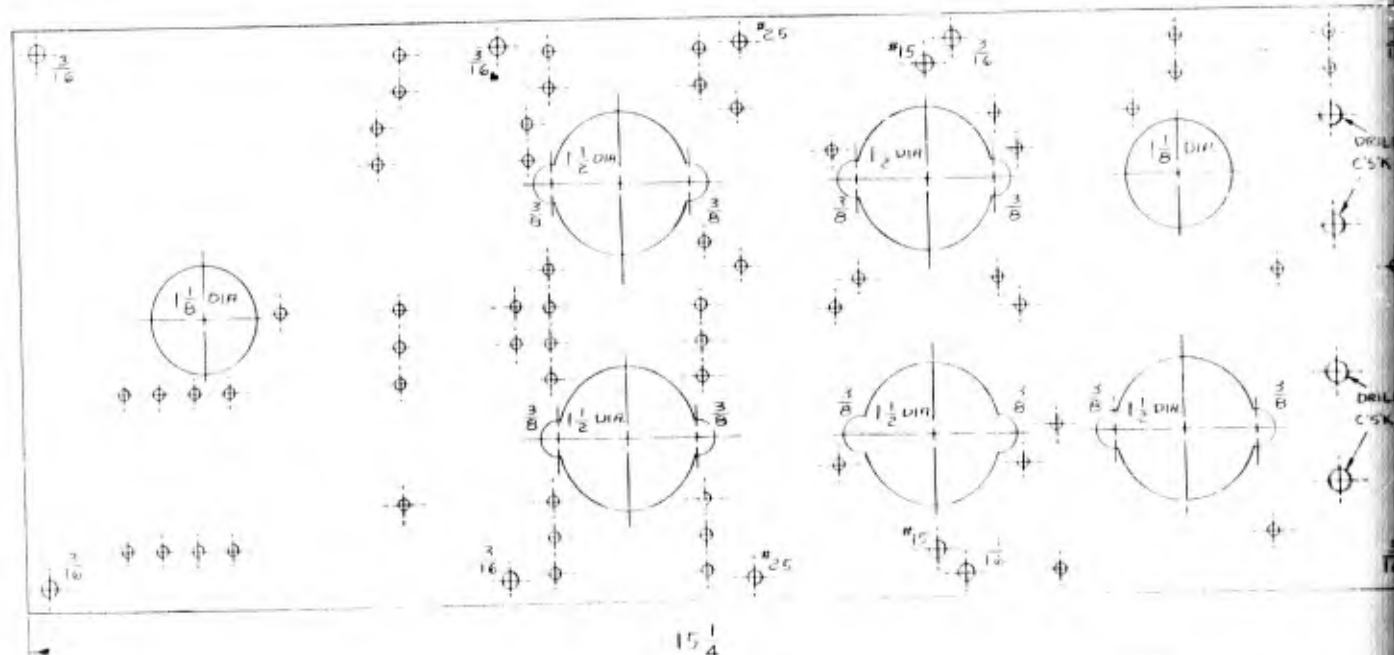
$$\text{Cost of 1000} = 50 \times 30 = 83$$

SUPPLY TERM
 #1724
 53 RECD

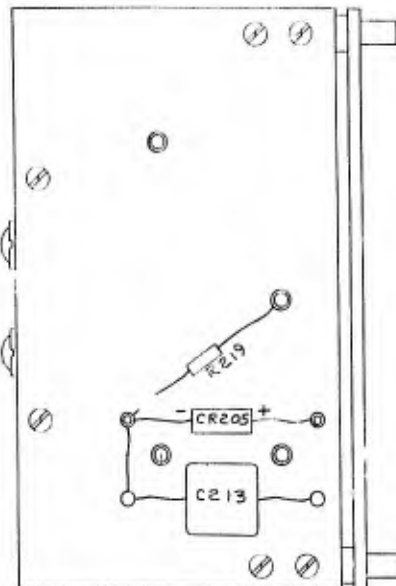
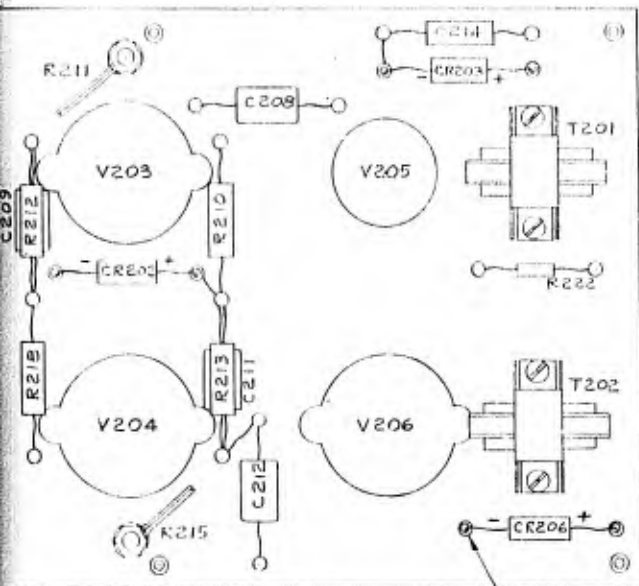
The schematic diagram illustrates the power supply circuitry, featuring four vacuum tubes labeled V201 through V204. V201 is a 6X4 rectifier tube connected to the AC input via R203. Its filament is powered by a transformer secondary winding (C204) through CR206 and CR207 diodes. V202 is a 6AR5 pentode used as a voltage doubler; its grid is connected to the B+ rail, and its plate provides the highest B+ potential. The filament for V202 is connected to the AC line through R205 and R206. V203 is a 6AV6 beam power tube whose filament is connected to the AC line through R211. V204 is another 6AV6 beam power tube with its filament connected to the AC line through R212. The B+ rail is formed by a series combination of resistors R208, R209, R210, and R213, which are connected to the positive output of V202. Various other components like capacitors C201, C202, C203, C205, C206, C207, C208, C209, C210, C211, C212, C213, C214, C215, C216, C217, C218, C219, C220, C221, C222, C223, C224, C225, C226, C227, C228, C229, C230, C231, C232, C233, C234, C235, C236, C237, C238, C239, C240, C241, C242, C243, C244, C245, C246, C247, C248, C249, C250, C251, C252, C253, C254, C255, C256, C257, C258, C259, C260, C261, C262, C263, C264, C265, C266, C267, C268, C269, C270, C271, C272, C273, C274, C275, C276, C277, C278, C279, C280, C281, C282, C283, C284, C285, C286, C287, C288, C289, C290, C291, C292, C293, C294, C295, C296, C297, C298, C299, C300, C301, C302, C303, C304, C305, C306, C307, C308, C309, C310, C311, C312, C313, C314, C315, C316, C317, C318, C319, C320, C321, C322, C323, C324, C325, C326, C327, C328, C329, C330, C331, C332, C333, C334, C335, C336, C337, C338, C339, C340, C341, C342, C343, C344, C345, C346, C347, C348, C349, C350, C351, C352, C353, C354, C355, C356, C357, C358, C359, C360, C361, C362, C363, C364, C365, C366, C367, C368, C369, C370, C371, C372, C373, C374, C375, C376, C377, C378, C379, C380, C381, C382, C383, C384, C385, C386, C387, C388, C389, C390, C391, C392, C393, C394, C395, C396, C397, C398, C399, C400, C401, C402, C403, C404, C405, C406, C407, C408, C409, C410, C411, C412, C413, C414, C415, C416, C417, C418, C419, C420, C421, C422, C423, C424, C425, C426, C427, C428, C429, C430, C431, C432, C433, C434, C435, C436, C437, C438, C439, C440, C441, C442, C443, C444, C445, C446, C447, C448, C449, C450, C451, C452, C453, C454, C455, C456, C457, C458, C459, C460, C461, C462, C463, C464, C465, C466, C467, C468, C469, C470, C471, C472, C473, C474, C475, C476, C477, C478, C479, C480, C481, C482, C483, C484, C485, C486, C487, C488, C489, C490, C491, C492, C493, C494, C495, C496, C497, C498, C499, C500, C501, C502, C503, C504, C505, C506, C507, C508, C509, C510, C511, C512, C513, C514, C515, C516, C517, C518, C519, C520, C521, C522, C523, C524, C525, C526, C527, C528, C529, C530, C531, C532, C533, C534, C535, C536, C537, C538, C539, C540, C541, C542, C543, C544, C545, C546, C547, C548, C549, C550, C551, C552, C553, C554, C555, C556, C557, C558, C559, C560, C561, C562, C563, C564, C565, C566, C567, C568, C569, C570, C571, C572, C573, C574, C575, C576, C577, C578, C579, C580, C581, C582, C583, C584, C585, C586, C587, C588, C589, C590, C591, C592, C593, C594, C595, C596, C597, C598, C599, C600, C601, C602, C603, C604, C605, C606, C607, C608, C609, C610, C611, C612, C613, C614, C615, C616, C617, C618, C619, C620, C621, C622, C623, C624, C625, C626, C627, C628, C629, C630, C631, C632, C633, C634, C635, C636, C637, C638, C639, C640, C641, C642, C643, C644, C645, C646, C647, C648, C649, C650, C651, C652, C653, C654, C655, C656, C657, C658, C659, C660, C661, C662, C663, C664, C665, C666, C667, C668, C669, C670, C671, C672, C673, C674, C675, C676, C677, C678, C679, C680, C681, C682, C683, C684, C685, C686, C687, C688, C689, C690, C691, C692, C693, C694, C695, C696, C697, C698, C699, C700, C701, C702, C703, C704, C705, C706, C707, C708, C709, C710, C711, C712, C713, C714, C715, C716, C717, C718, C719, C720, C721, C722, C723, C724, C725, C726, C727, C728, C729, C730, C731, C732, C733, C734, C735, C736, C737, C738, C739, C740, C741, C742, C743, C744, C745, C746, C747, C748, C749, C750, C751, C752, C753, C754, C755, C756, C757, C758, C759, C760, C761, C762, C763, C764, C765, C766, C767, C768, C769, C770, C771, C772, C773, C774, C775, C776, C777, C778, C779, C780, C781, C782, C783, C784, C785, C786, C787, C788, C789, C790, C791, C792, C793, C794, C795, C796, C797, C798, C799, C800, C801, C802, C803, C804, C805, C806, C807, C808, C809, C810, C811, C812, C813, C814, C815, C816, C817, C818, C819, C820, C821, C822, C823, C824, C825, C826, C827, C828, C829, C830, C831, C832, C833, C834, C835, C836, C837, C838, C839, C840, C841, C842, C843, C844, C845, C846, C847, C848, C849, C850, C851, C852, C853, C854, C855, C856, C857, C858, C859, C860, C861, C862, C863, C864, C865, C866, C867, C868, C869, C870, C871, C872, C873, C874, C875, C876, C877, C878, C879, C880, C881, C882, C883, C884, C885, C886, C887, C888, C889, C890, C891, C892, C893, C894, C895, C896, C897, C898, C899, C900, C901, C902, C903, C904, C905, C906, C907, C908, C909, C910, C911, C912, C913, C914, C915, C916, C917, C918, C919, C920, C921, C922, C923, C924, C925, C926, C927, C928, C929, C930, C931, C932, C933, C934, C935, C936, C937, C938, C939, C940, C941, C942, C943, C944, C945, C946, C947, C948, C949, C950, C951, C952, C953, C954, C955, C956, C957, C958, C959, C960, C961, C962, C963, C964, C965, C966, C96

INDICATOR
SEE 7

PANEL MTG POST
2 REQ'D
SEE #A-30754



TOPRE: 1000000 LUG
 C.T.C. #17240
 53 REQ'D



INDICATOR M'T'G. PLATE
 SEE A-30752

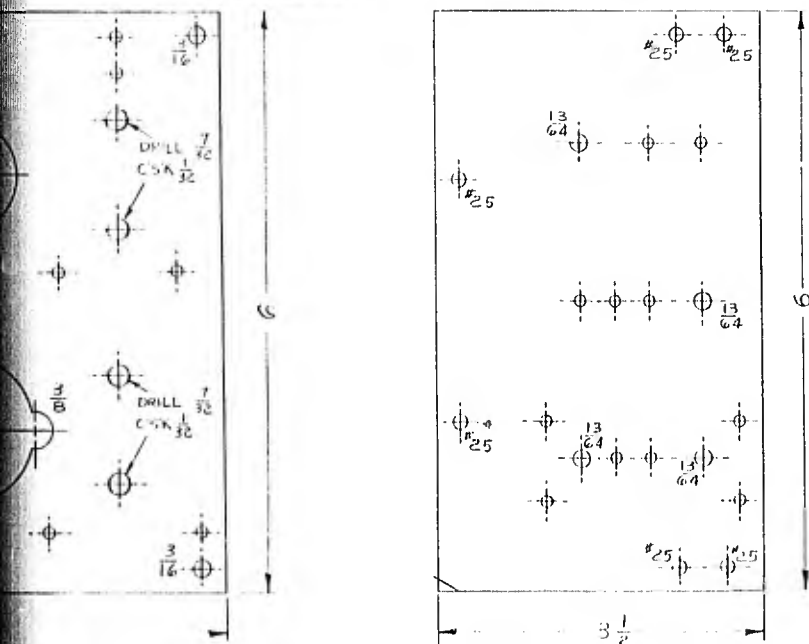
#6-32 FASTENINGS
 ALL OTHER #6-32

HOLLOW TERMINAL LUG
 C.T.C. #1558D
 18 REQ'D.
 SOLDER ALL CRYSTAL
 PIGTAILS INTO LUG
 AS SHOWN.

ASS'Y NOTE
 1. V201, V202, V203, V204, V205, V206, & V207
 ARE NOT PARTS OF THIS ASS'Y & ARE
 INDICATED FOR REFERENCE ONLY.



STANDOFF-RIVET TYPE
 C.T.C. #1246D
 8 REQ'D.

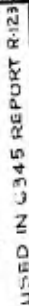


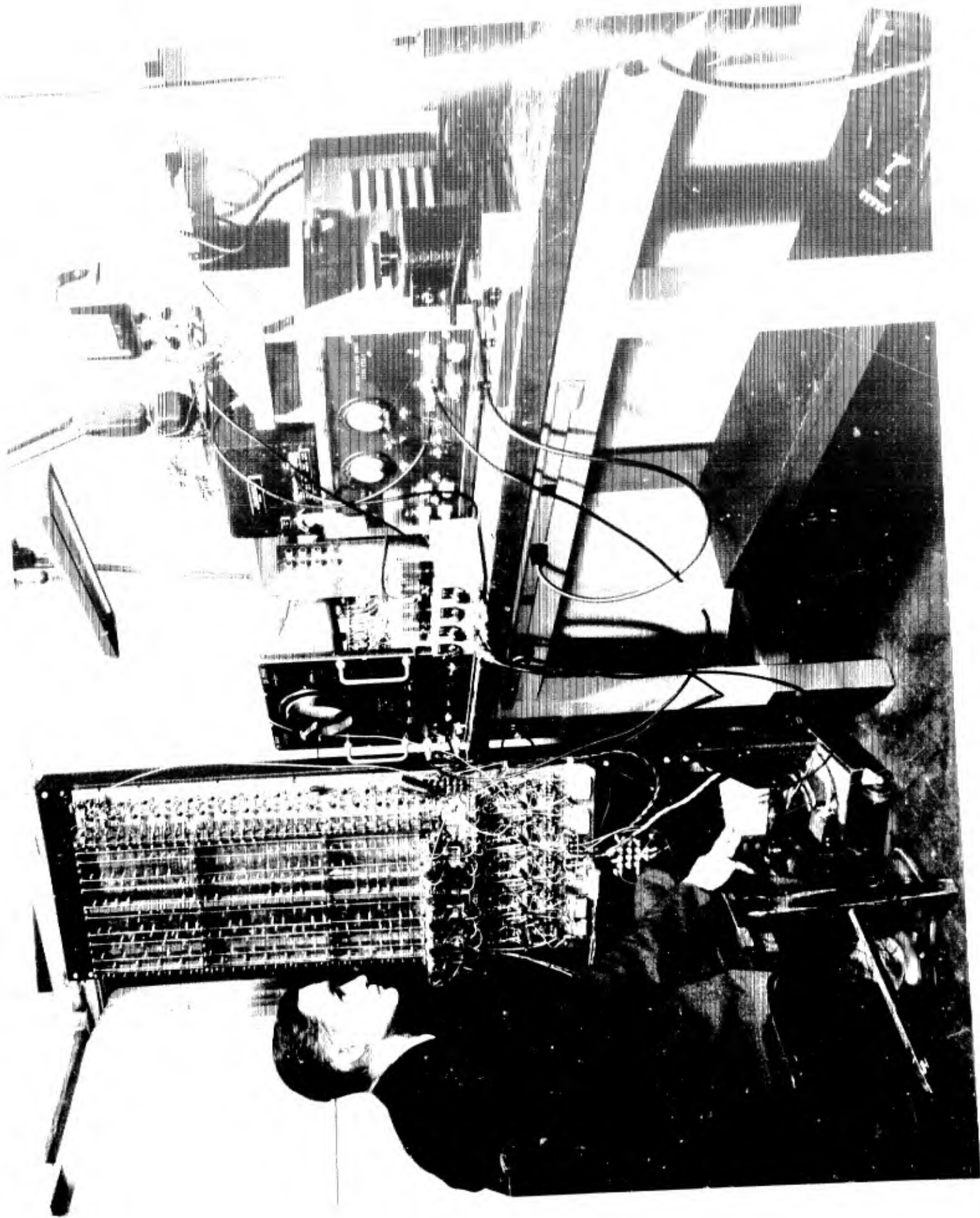
NOTES
 1. MAT'L - 1/8 TH'K LINEN BASE PHENOLITE
 2. HOLES NOT NOTED DRILL #32

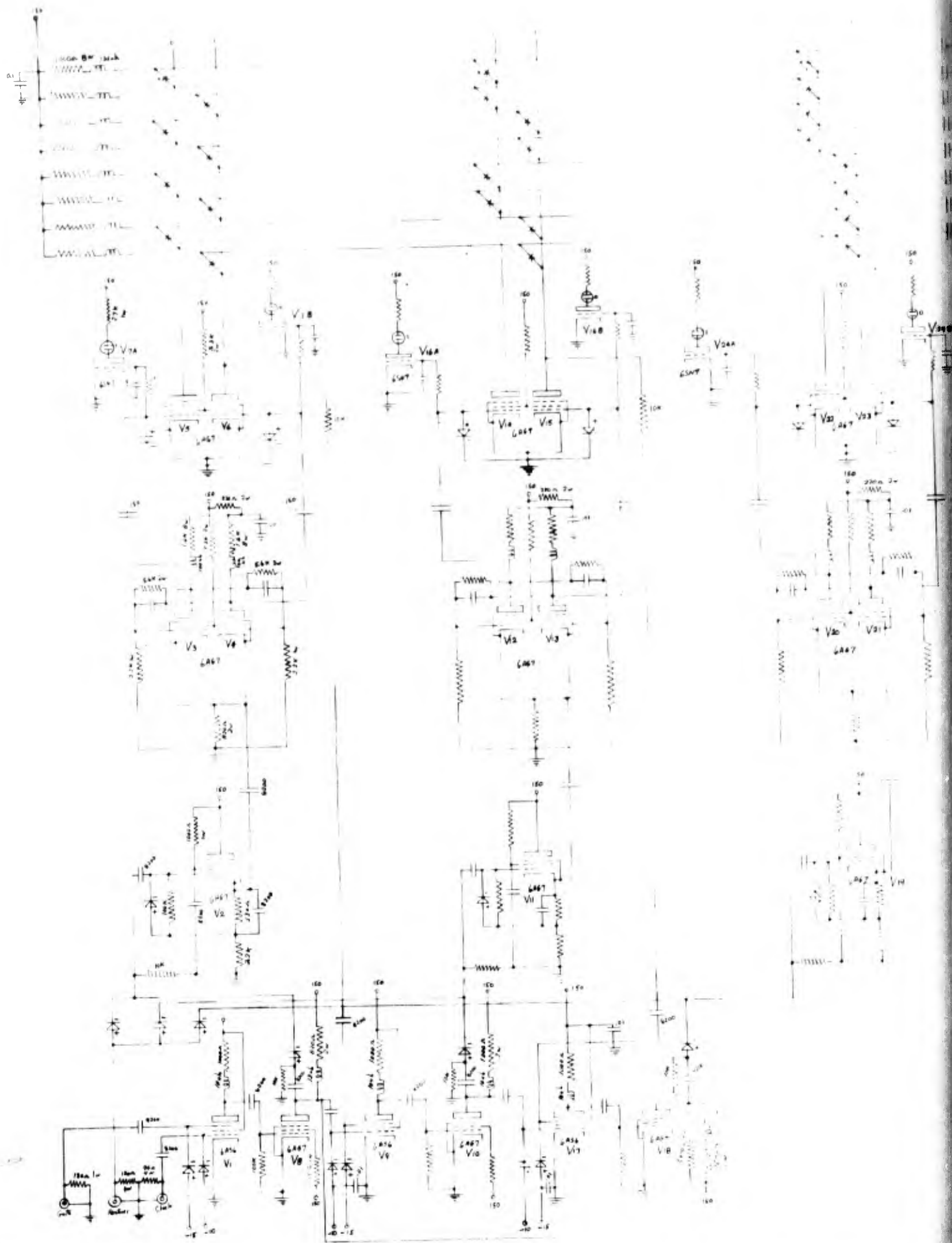
PROGRAM REGISTER DRILLING
 TEMPLATE & ASS'Y.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY			
SUPPLEMENTARY LABORATORY			
S.I.C. NO.	DR. NO.	DR. NO.	DR. NO.
6-545	14-14	14-14	14-14
D-30799-1			

D-30672

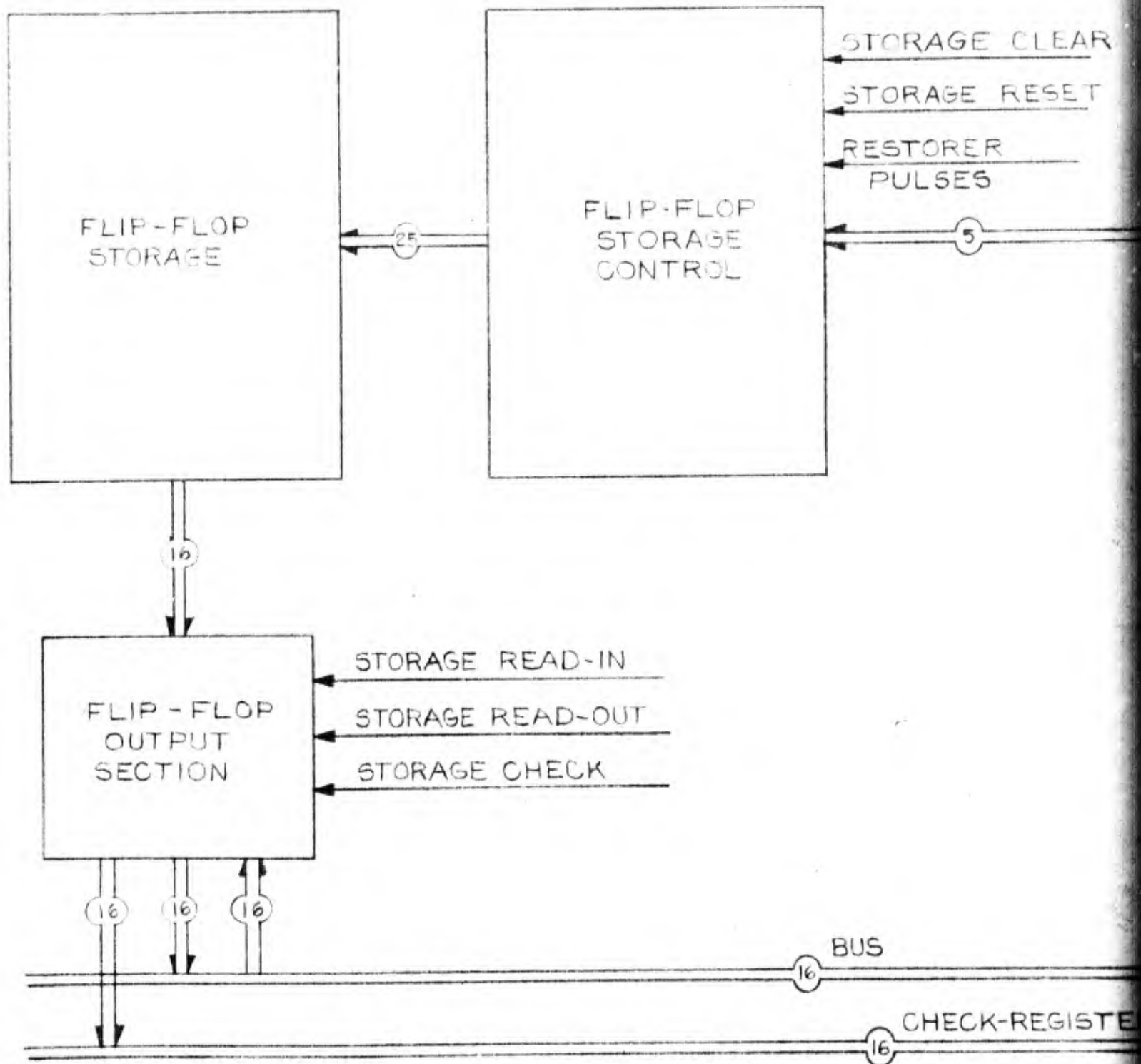






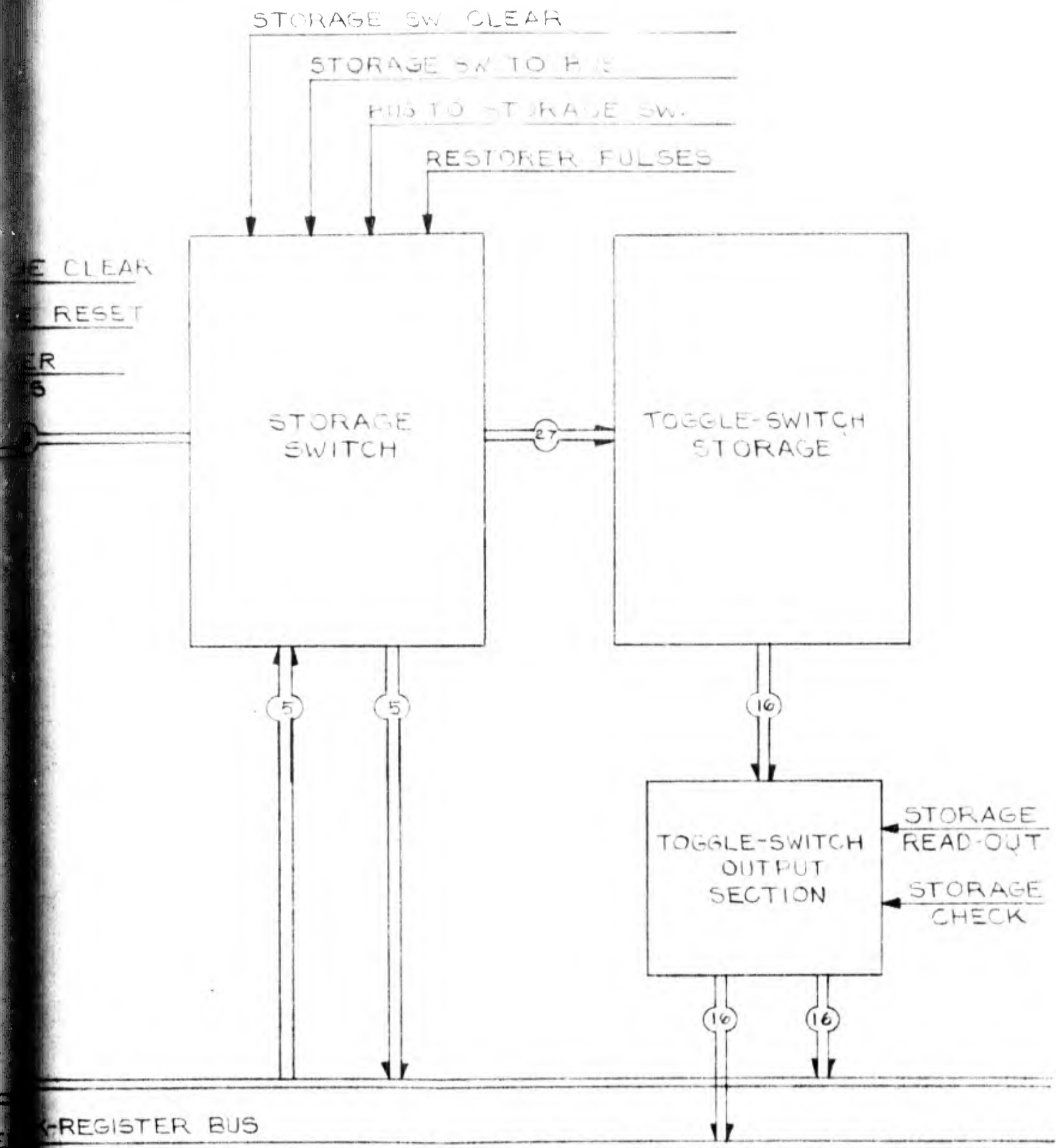
STORAGE DRAWING LIST
(Block Diagram Reference 200)

200	Storage - General Arrangement	B-31150
201	32-position Switch - Block Schematic	C-31152
201	32-position Switch - Circuit Schematic	D-30672
201	32-position Switch - Photograph	A-30694
202	Toggle Switch Storage - Block Schematic	B-31151
203	Flip-flop Storage - Block Schematic	SD-39278
203	Flip-flop Storage - Circuit Schematic	SD-39285
203	Flip-flop Storage Output - Circuit Schematic	SD-39286
203	Flip-flop Register Panel Assembly	E-30900
203	Flip-flop Register Assembly	D-30872
203	Flip-flop Storage Output Assembly	D-30879



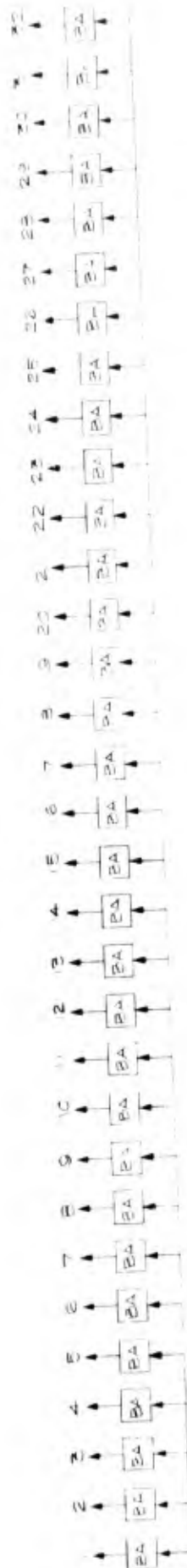
NOTE: THIS DRAWING
SUPERSEDES SD-39277-1,
11/4/47.

STORAGE-GENERAL

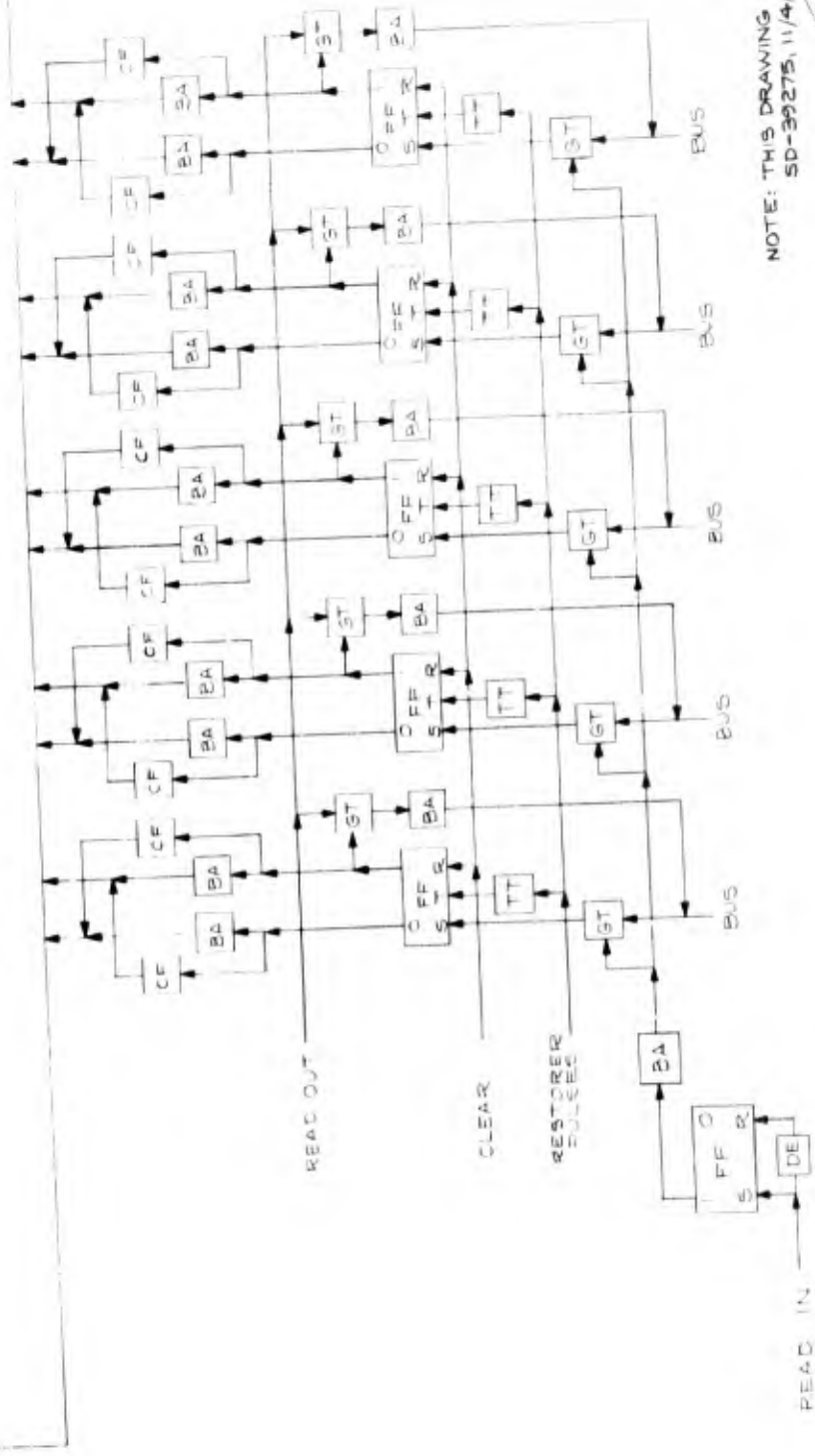


GENERAL ARRANGEMENT

6345 FZ.WOLSKY 10/23/47
B-31150



CRYSTAL MATRIX

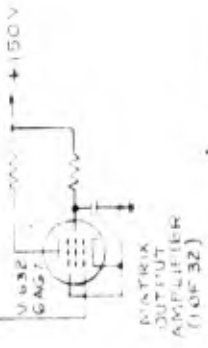
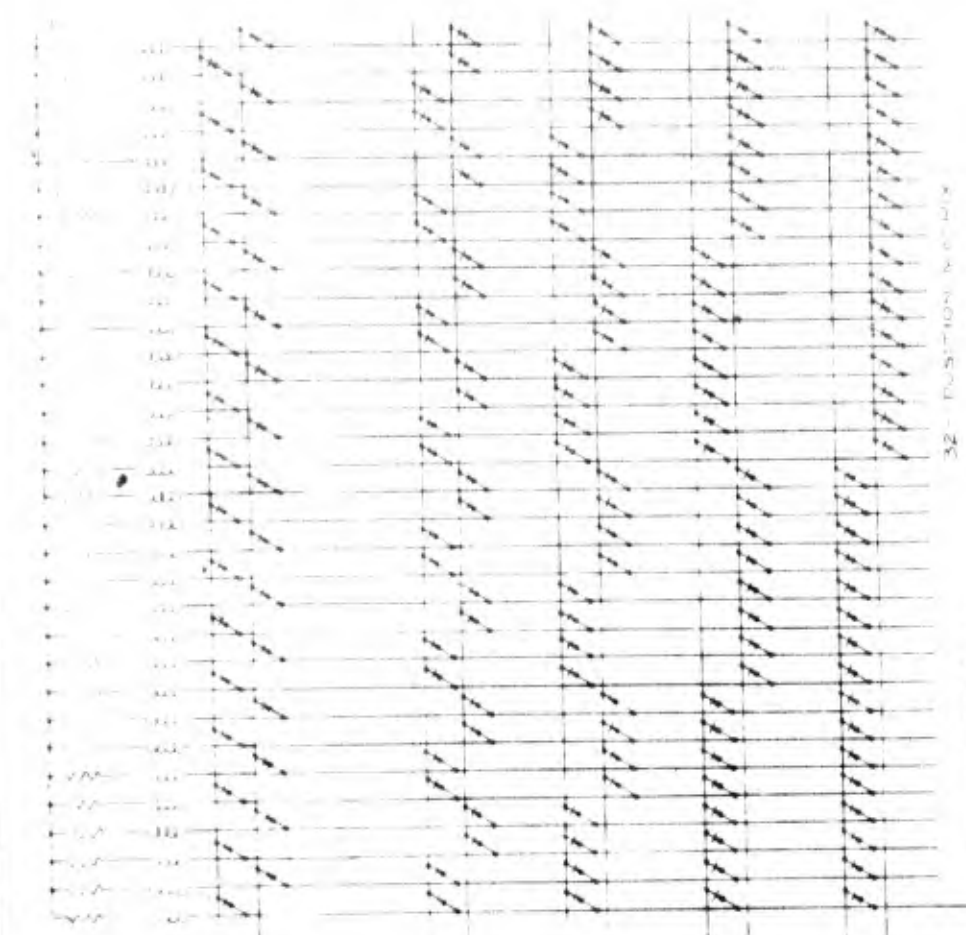
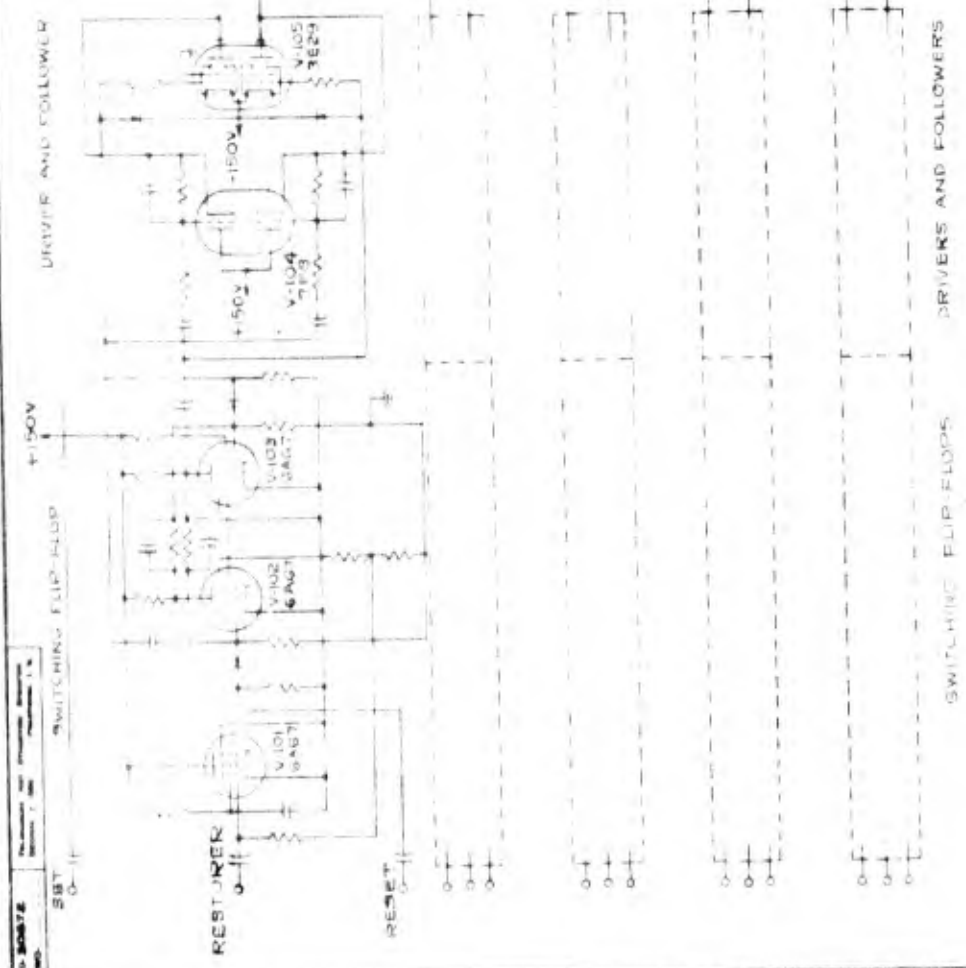


32-POSITION SWITCH
BLOCK SCHEMATIC

NOTE: THIS DRAWING SUPERSEDES
SD-39275, 11/4/47.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY	
6345	10/11/47
6345	C-31152

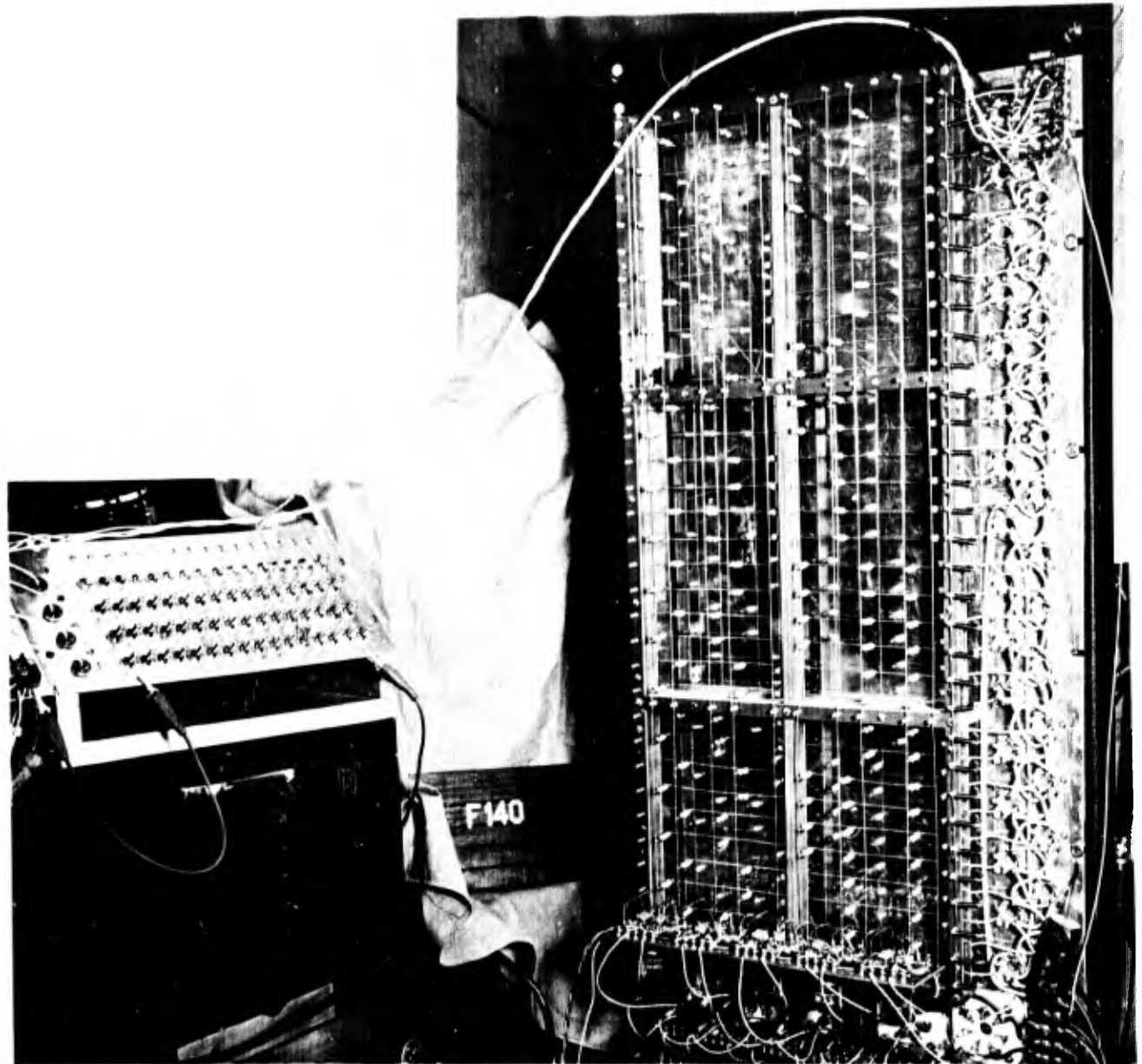
D-30672
 Replaces 207 Previous Issue
 Revision 1 of 1



USED IN G-345 REPORT R123

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419	1420	1421	1422	1423	1424	1425	1426	1427	1428	1429	1430	1431	1432	1433	1434	1435	1436	1437	1438	1439	1440	1441	1442	1443	1444	1445	1446	1447	1448	1449	1450	1451	1452	1453	1454	1455	1456	1457	1458	1459	1460	1461	1462	1463	1464	1465	1466	1467	1468	1469	1470	1471	1472	1473	1474	1475	1476	1477	1478	1479	1480	1481	1482	1483	1484	1485	1486	1487	1488	1489	1490	1491	1492	1493	1494	1495	1496	1497	1498	149
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-----

MASSACHUSETTS INSTITUTE OF TECHNOLOGY		
SERVOMECHANISMS LABORATORY		
D. I. C. NO. 6345	DR.	CK.
ENG. J. A. O'B	APP.	A-30694



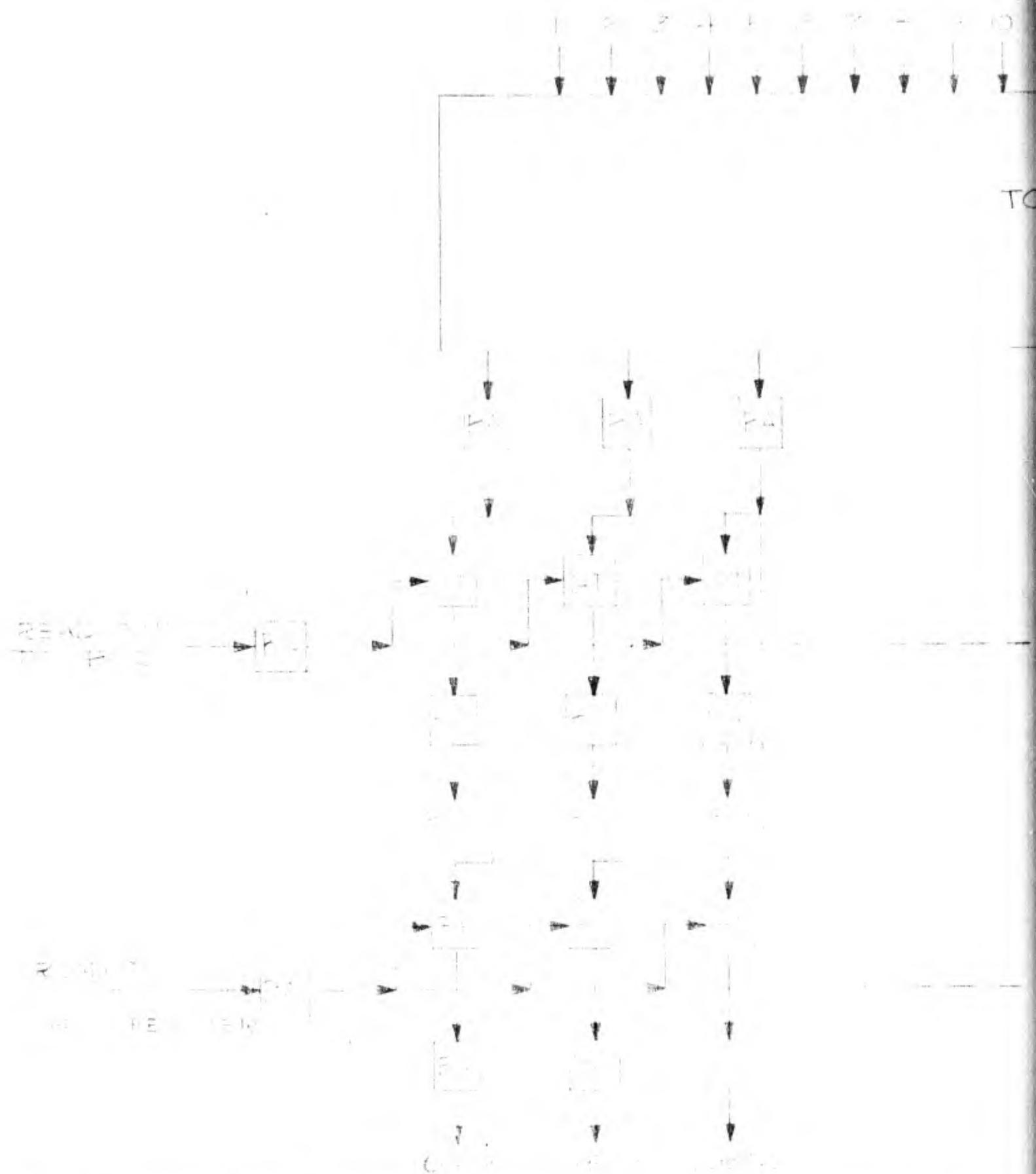
CRYSTAL MATRIX AND TOGGLE SWITCH STORAGE
USED IN THE 32 POSITION SWITCH

A-30694

USED IN 6345 REPORT R-123

3-31151

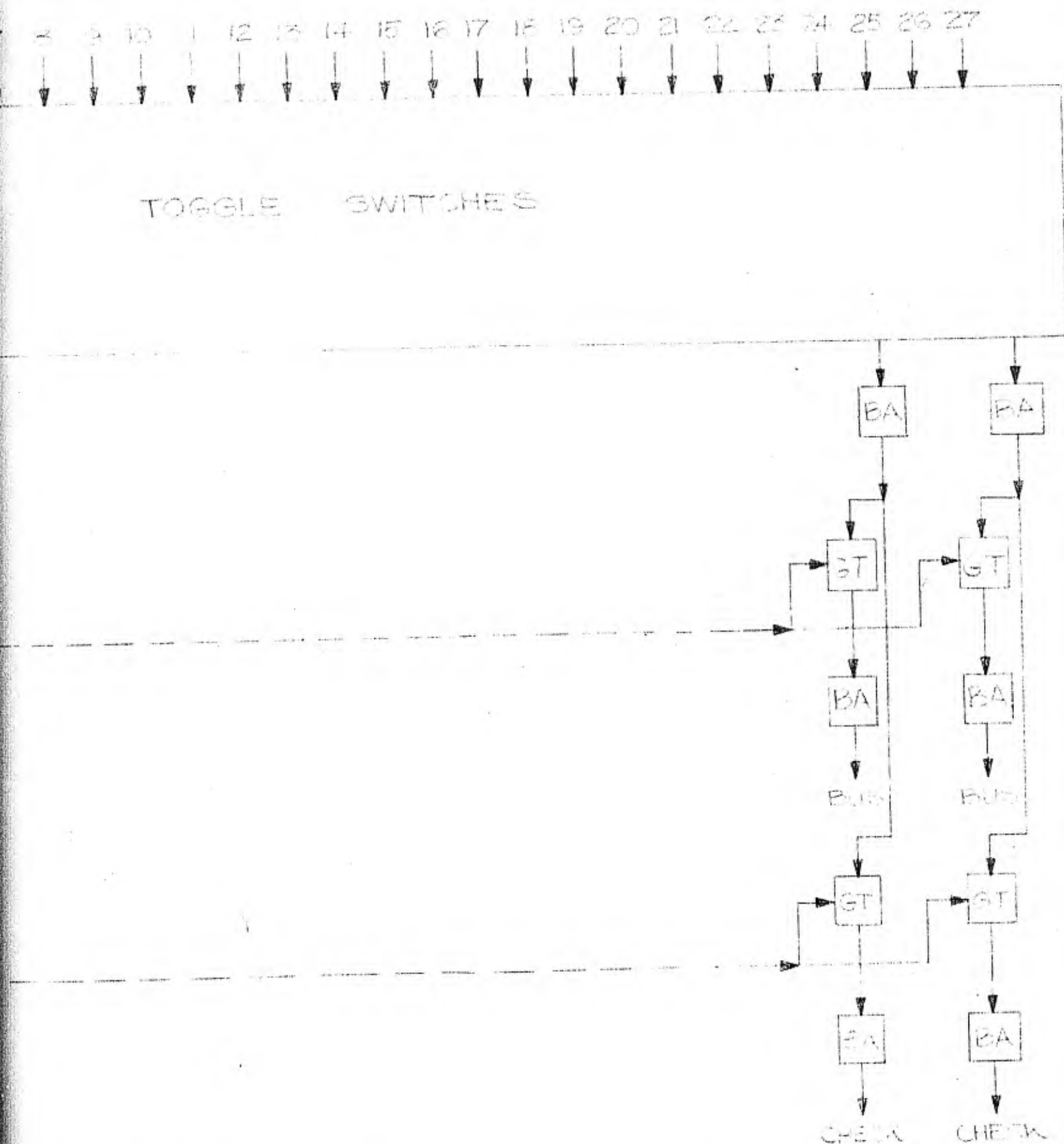
FILE TH



NOTE: THIS DRAWING SUPERSEDES
SD-39276, 11/4/47.

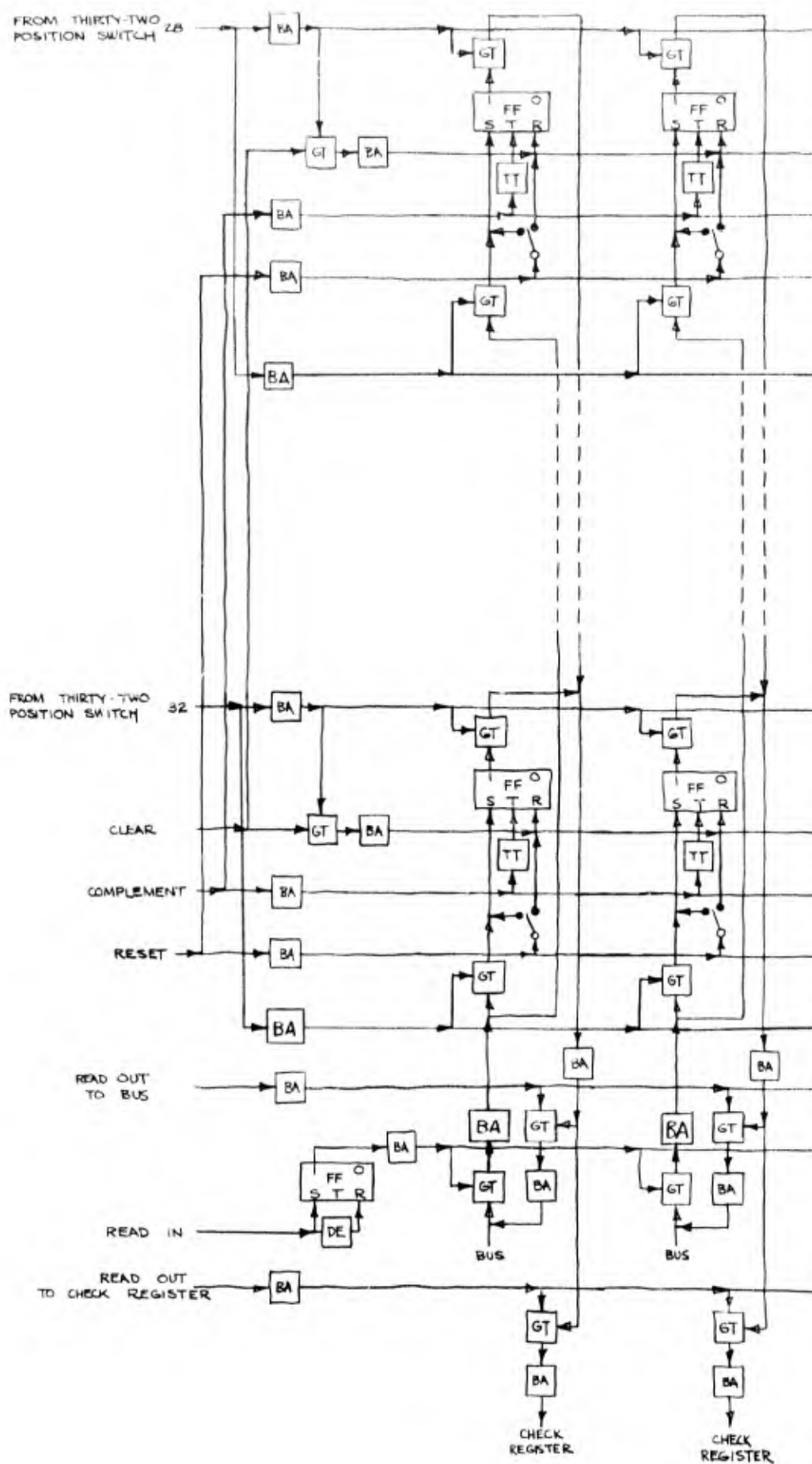
TOGGLE-SW
BLOCK

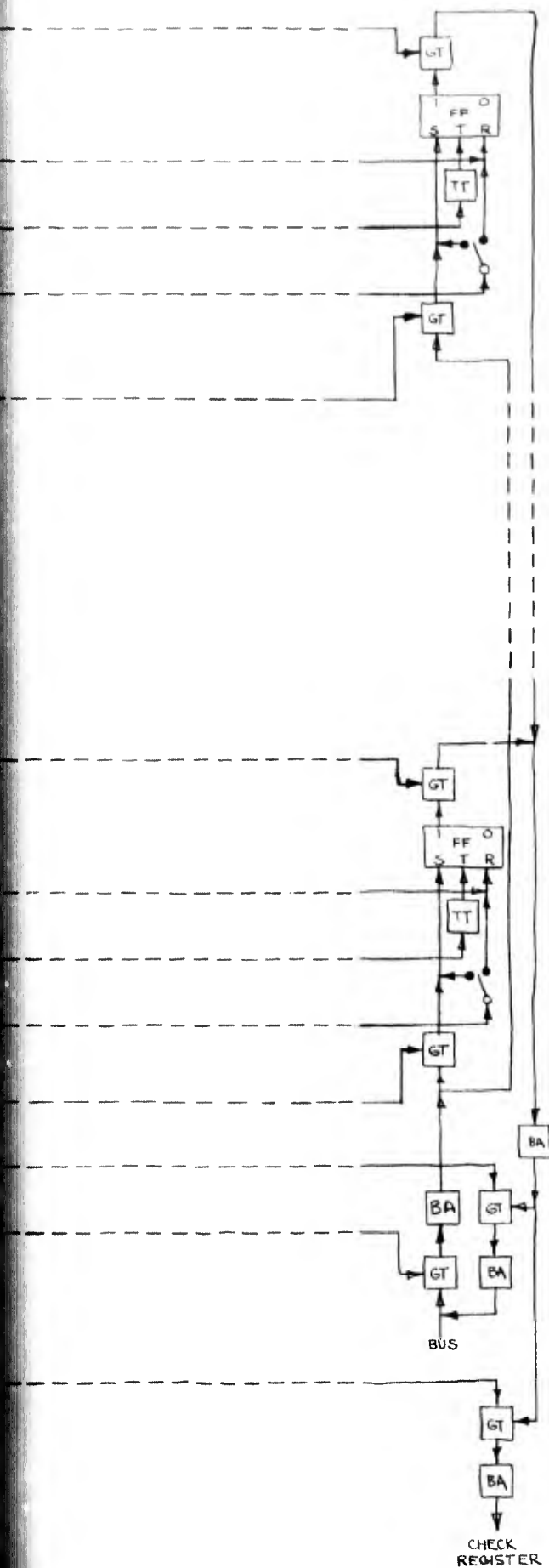
ROM THIRTY-TWO POSITION SWITCH



TOGGLE-SWITCH STORAGE
BLOCK SCHEMATIC

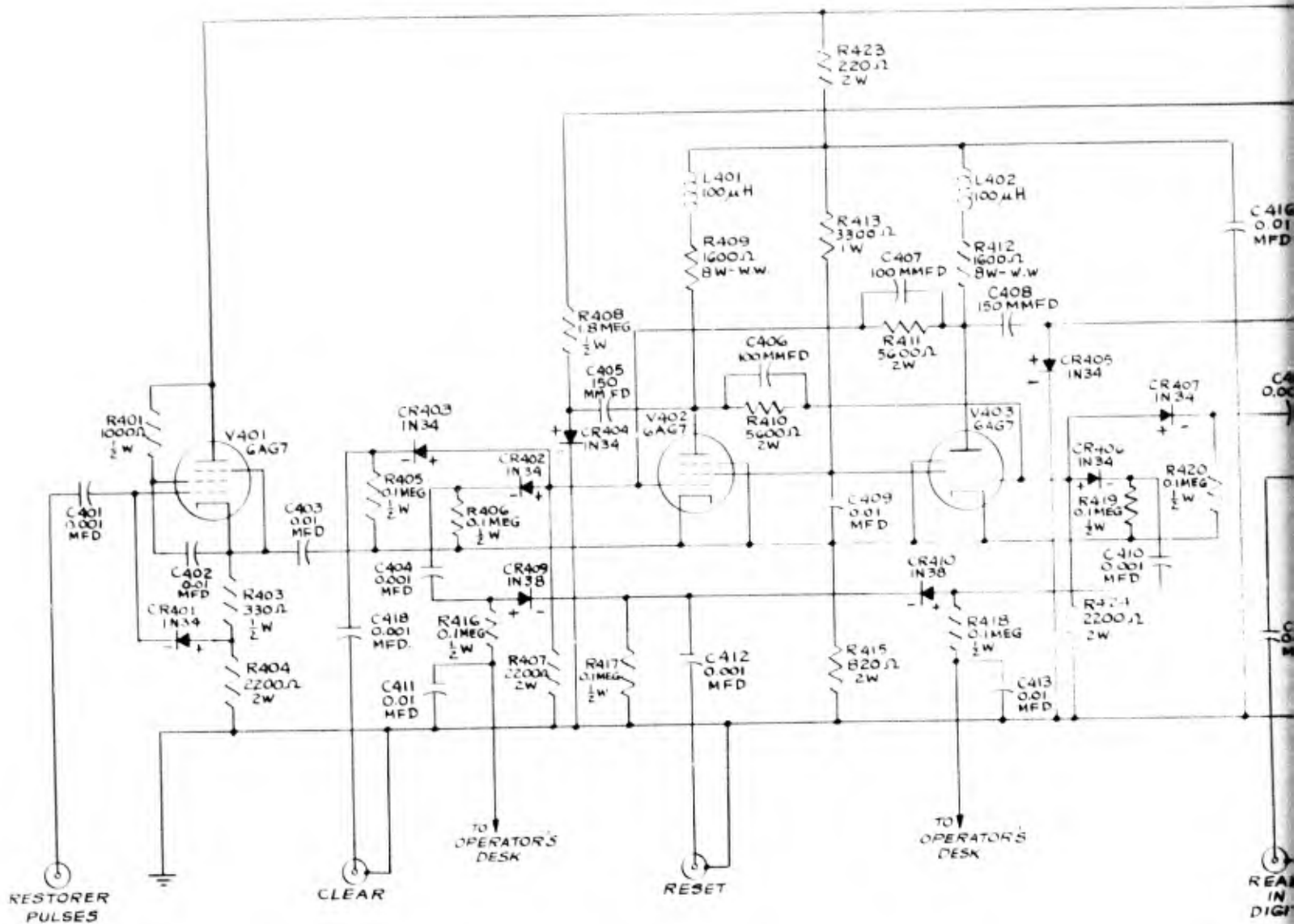
6345		McHugh 10/30/47	
R.R.B.		B-31151	

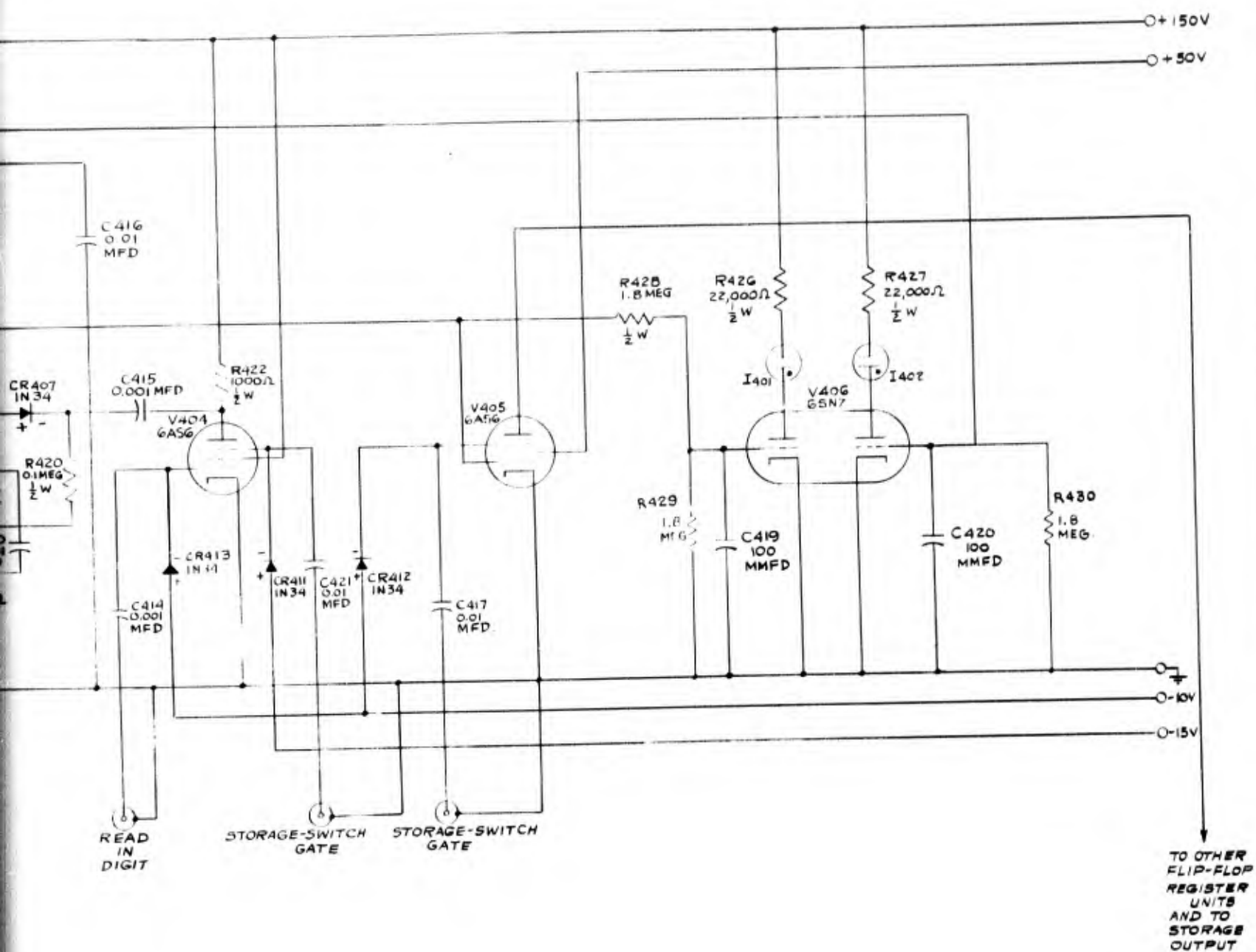




FLIP-FLOP STORAGE
BLOCK SCHEMATIC
D.R.B. JUNE 27, 1947

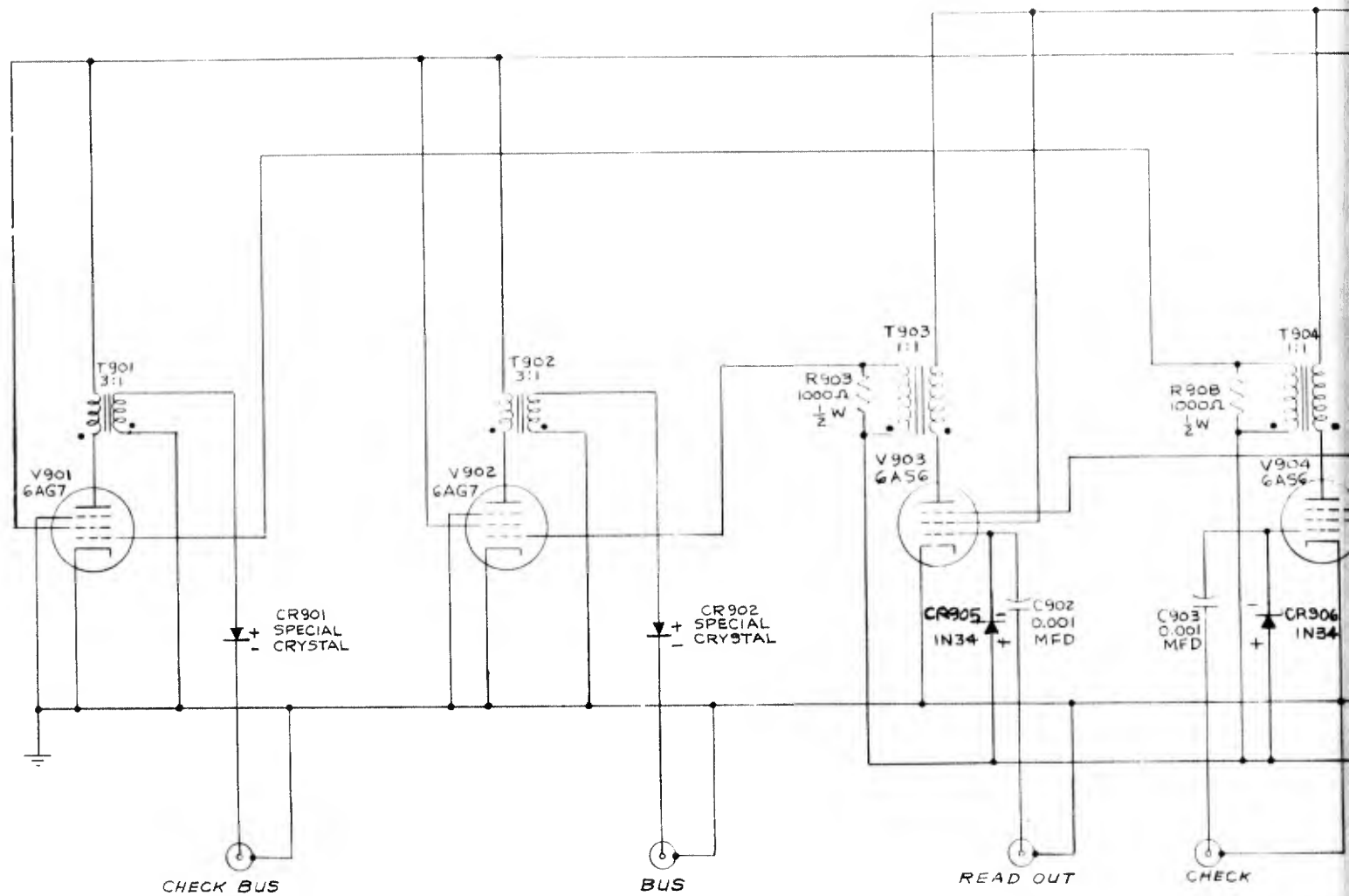
6345 DRB
DRB SD-3927A-1/

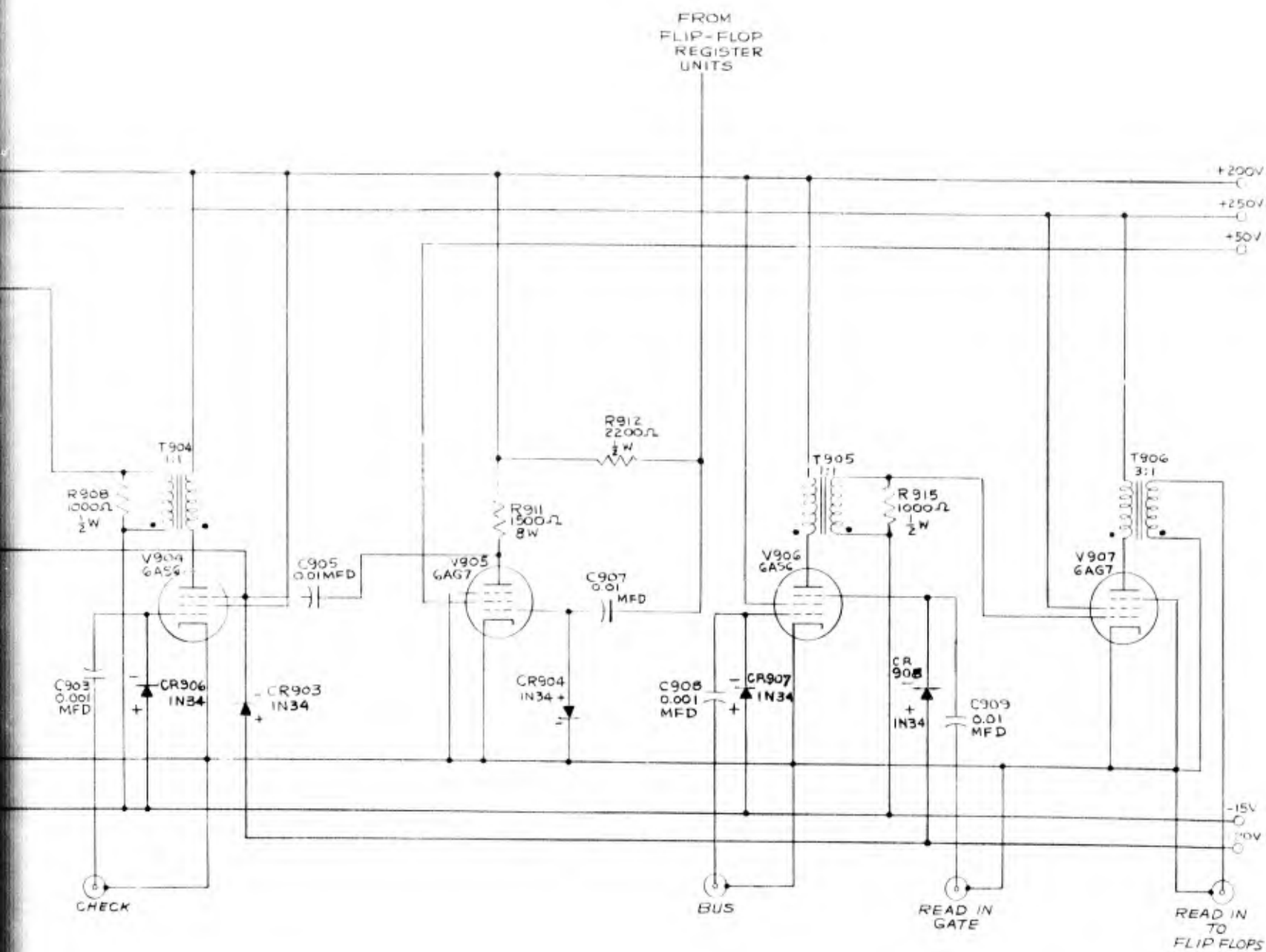




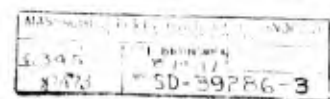
FLIP-FLOP REGISTER
 CIRCUIT SCHEMATIC

6345 1000000000
 8-11-41
 242 50-39285-3



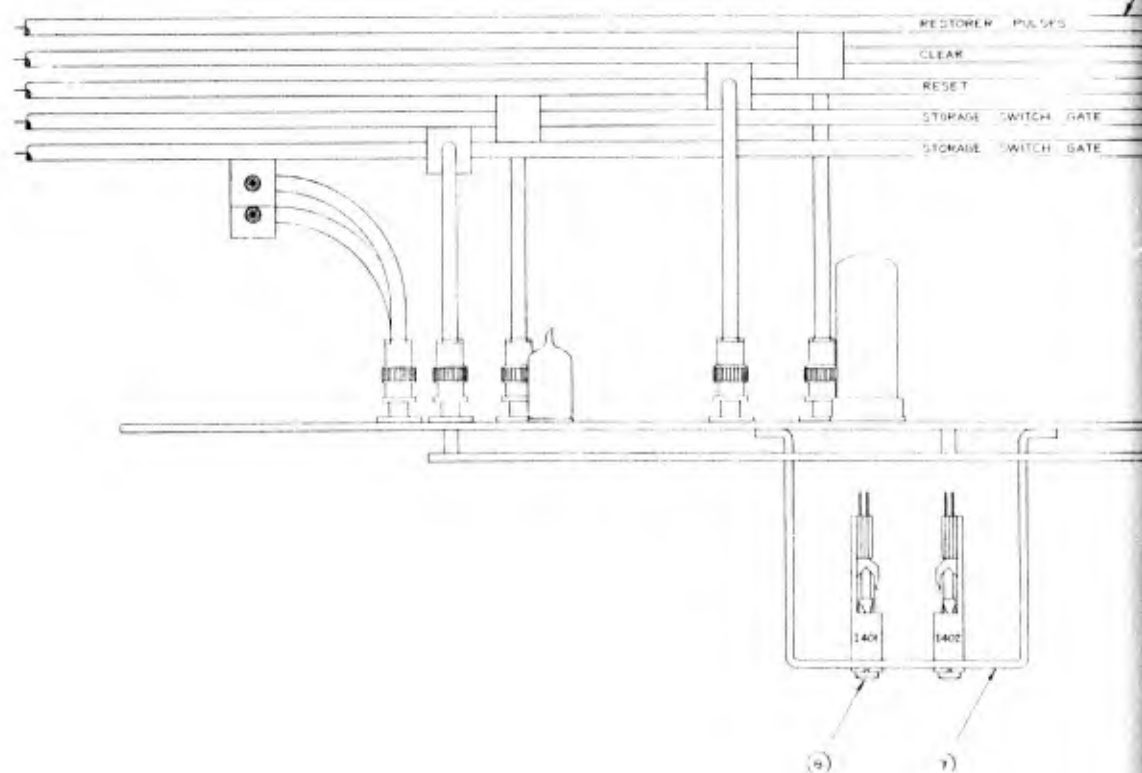
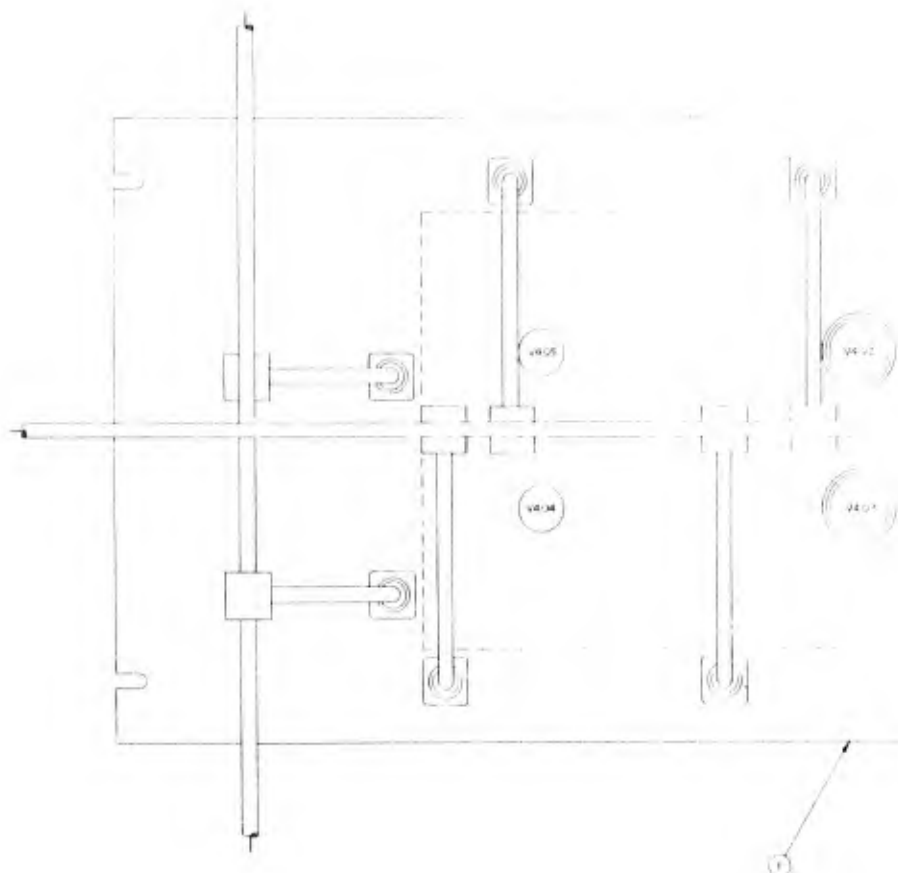


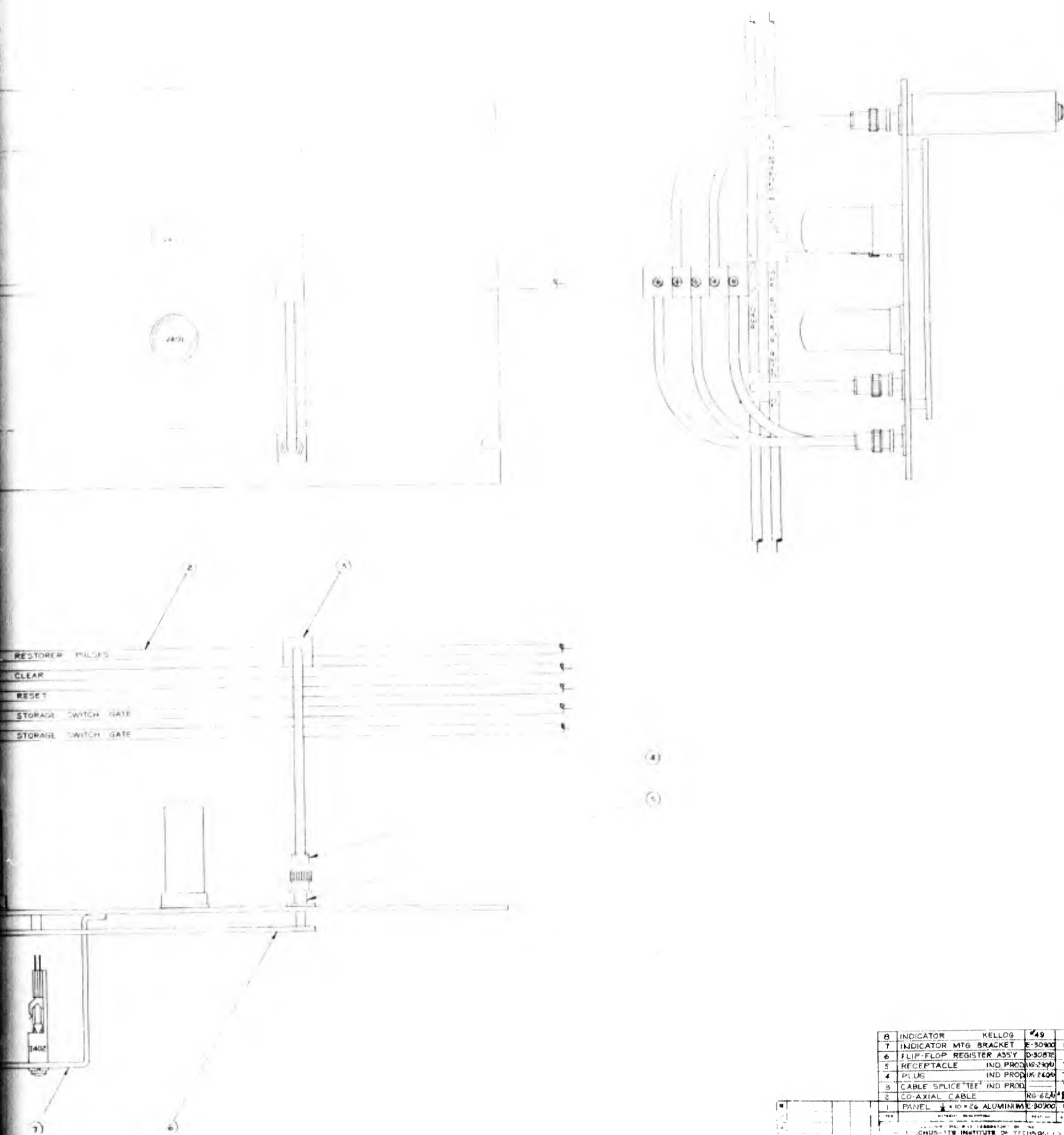
FLIP-FLOP STORAGE
OUTPUT CIRCUIT SCHEMATIC



140000

50001 235





8	INDICATOR	KELLOG	#49	
7	INDICATOR MTG BRACKET	E-30900	1	
6	FLIP-FLOP REGISTER ASSY	D-30870	1	
5	RECEPTACLE	IND PRODUS 2400	7	
4	PLUG	IND PRODUS 1400	7	
3	CABLE SPLICE TEE	IND PRODUS 1400	7	
2	CO-AXIAL CABLE	RG-62U	1	
1	PANEL	1/2 x 10 x 26 ALUMINUM	E-30900	1

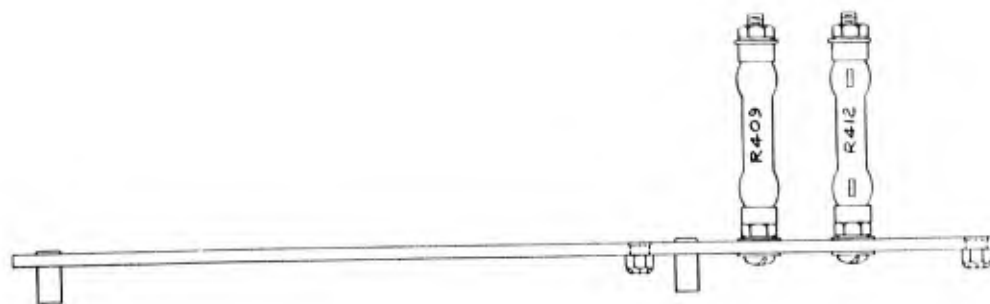
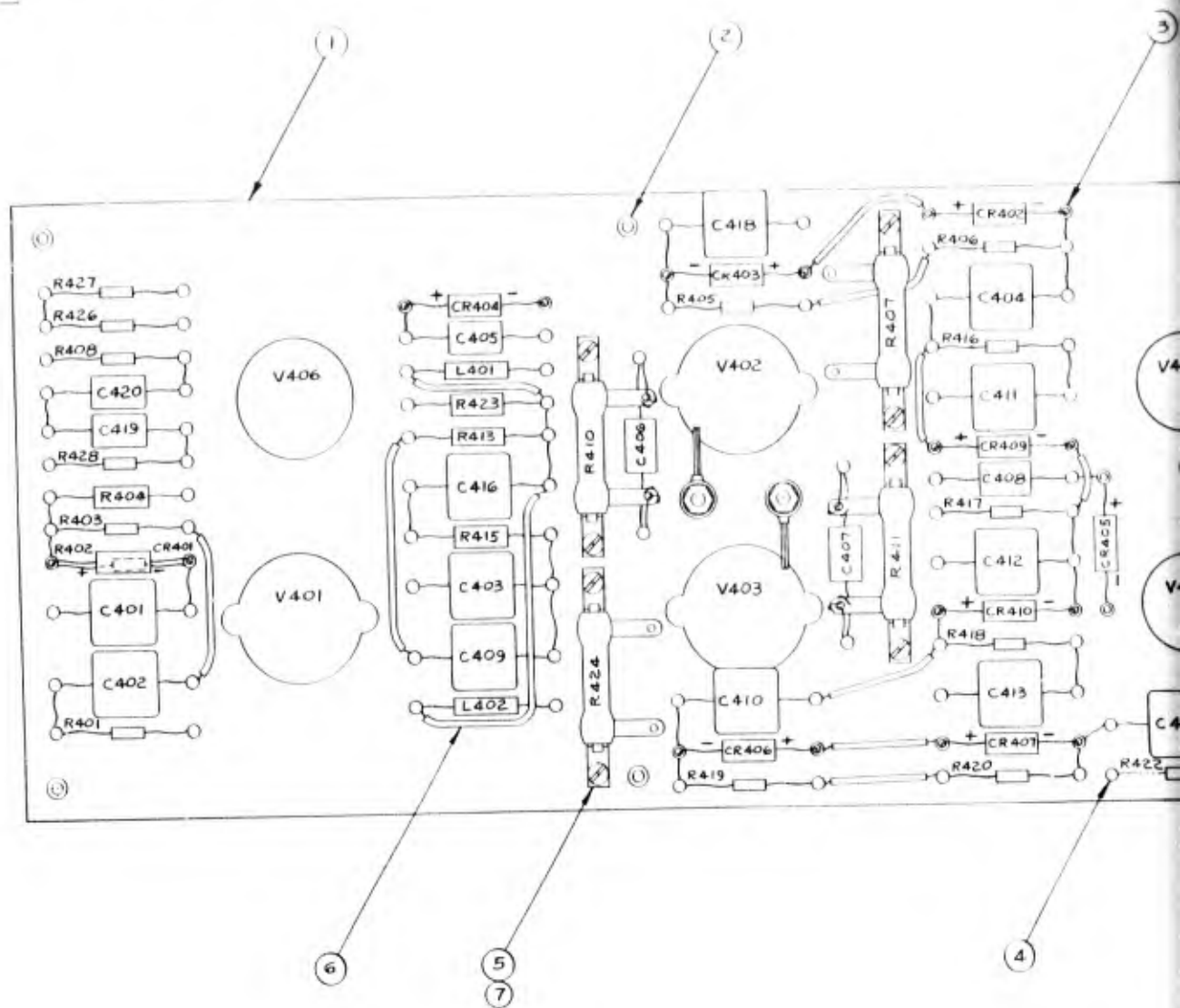
FLIP-FLOP REGISTER PANEL ASSY	
FULL	9-10-45
848	E-30900

D-30872

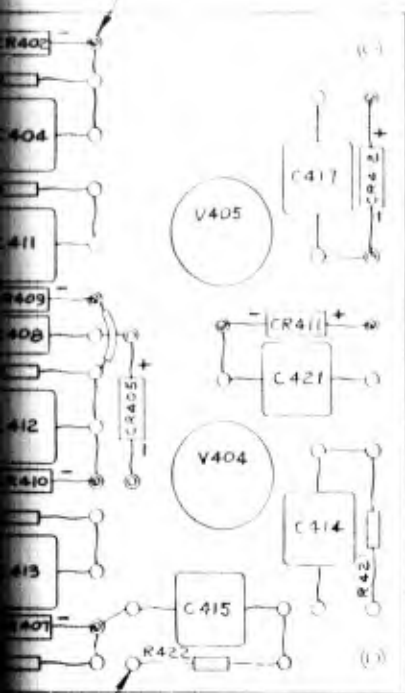
WO-

TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL ± .005 FRACTIONAL ± 1/16

USED IN ASSY SD-39285



SOLDER ALL CRYSTAL PIGTAILS
INTO LUGS AS SHOWN



NOTES

1. R407, R410, R411, & R421 ARE AS IDENTIFIED ON 5D-39285 EXCEPT THAT RATING IS INCREASED TO 8 WATTS.
2. V401, V402, V403, V404, V405, & V406 ARE NOT PARTS OF THIS ASS'Y & ARE INDICATED FOR REFERENCE USE ONLY.

7	CLINCH NUT	ELASTIC STOP NUT CORP.	22C5-62	8
6	CAMBRIC SLEEVING			AS REQD
5	RESISTOR MTG FOR 116B RESISTOR	I.T.E.		8
4	TURRET LUG SINGLE	CTC	1724D	86
3	TURRET LUG HOLLOW	CTC	1558D	22
2	MOUNTING POST	CTC	1246D	6
1	RESISTOR BOARD		0-30872	1

P				Q			
N				F			
M				E			
L				D			
K				C			
J				B			
H				A			
WAS	APP.	DATE		WAS	APP.	DATE	

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

FLIP-FLOP REGISTER ASS'Y

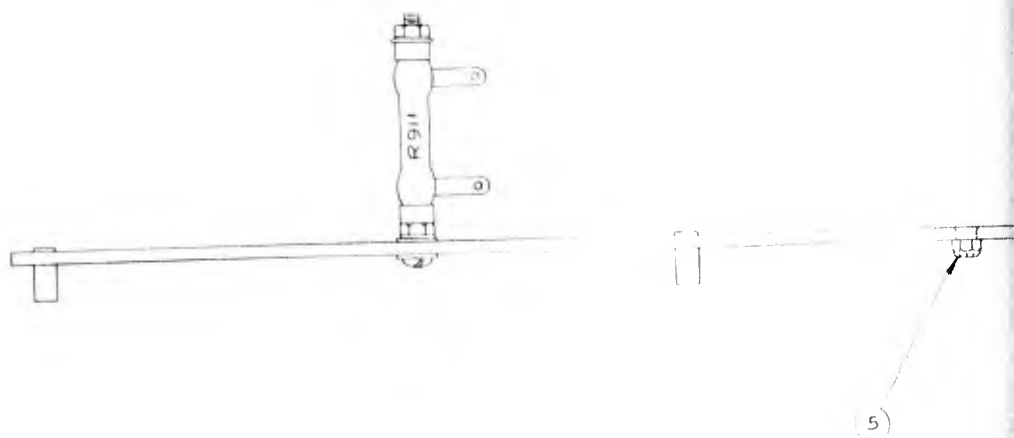
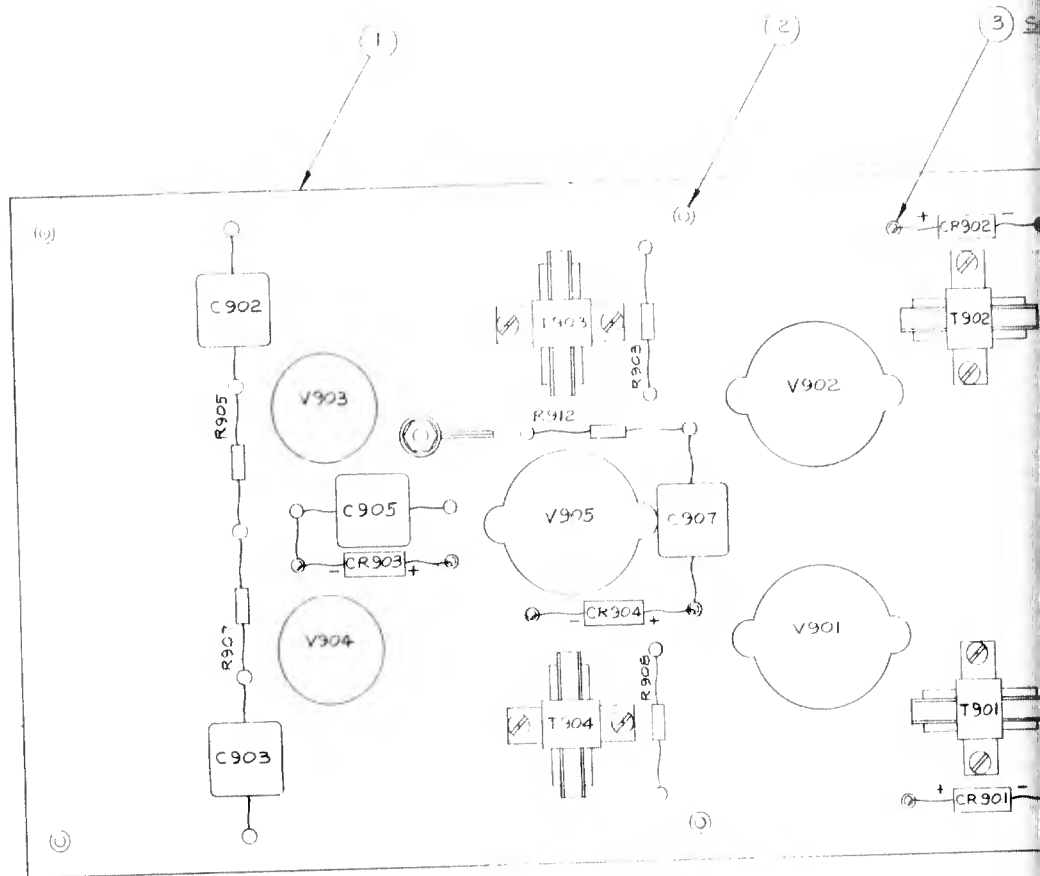
SCALE: FULL DR 20C22 3-5-47
TR BRS CK. APP. D-30872

2

D-30879
WO.

TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL $\pm .005$ FRACTIONAL $\pm \frac{1}{16}$

USED IN ASSY SD-39286



ARITHMETIC ELEMENT DRAWING LIST

(Block Diagram Reference 300)

300 Arithmetic Element, Whirlwind I	C-37072
5-digit Multiplier, Photograph	FB-265
Multiplier Digit, Photograph	FB-267
Circuit Schematic	D-30369
201 A Register	SD-39335
303 B Register	SD-39333
306 Multiplier Control	
Photograph	FB-231
Photograph	FB-232
Block Schematic	C-30906
Circuit Schematic	SD-39318
Power Control	SB-39320
Power Control	SB-39334
300 Multiplier Assembly and Details	R-37511
	D-37512
	D-37513
	D-37514
	D-37515
	D-37516
	D-37517
	D-37518
	C-37531
	C-37522
300 Multiplier Color Code	A-30631

M-147

- 10 -

Arithmetic Element Drawing List (Continued)

300 Multiplier Cables

SA-39321
SA-39322
SB-39323
SB-39324
SB-39325
SB-39326
SB-39327

305 Step Counter

Photograph

FB-270

Circuit Schematic

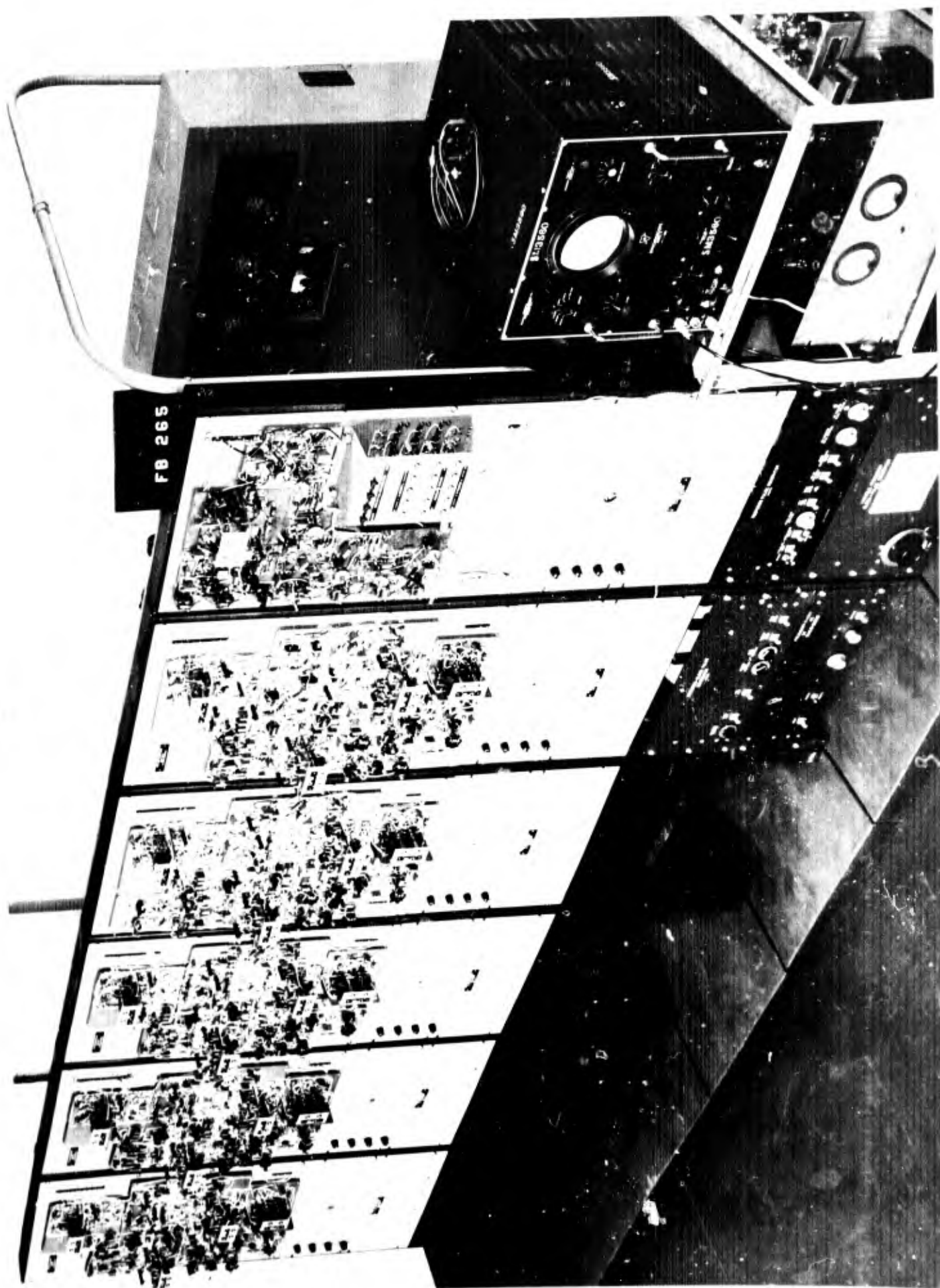
E-30834

Panel Assembly

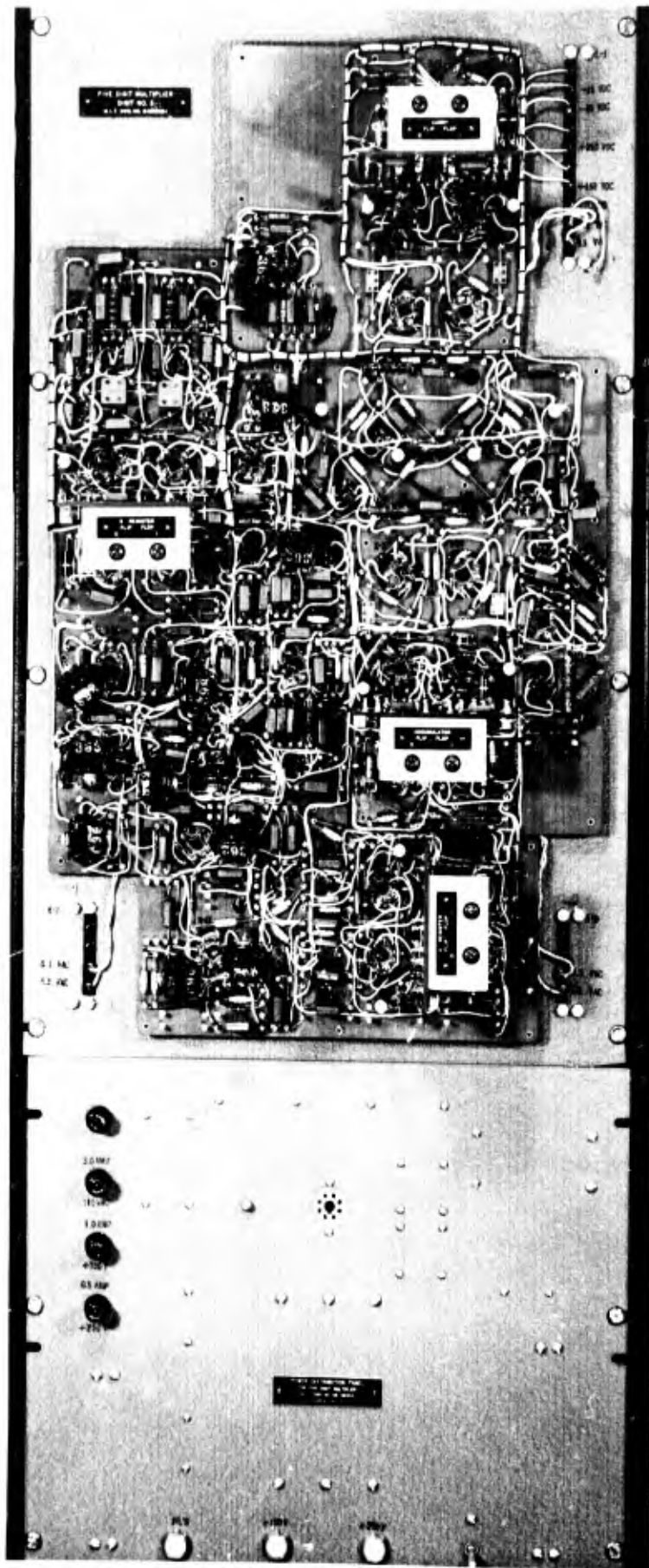
D-30878

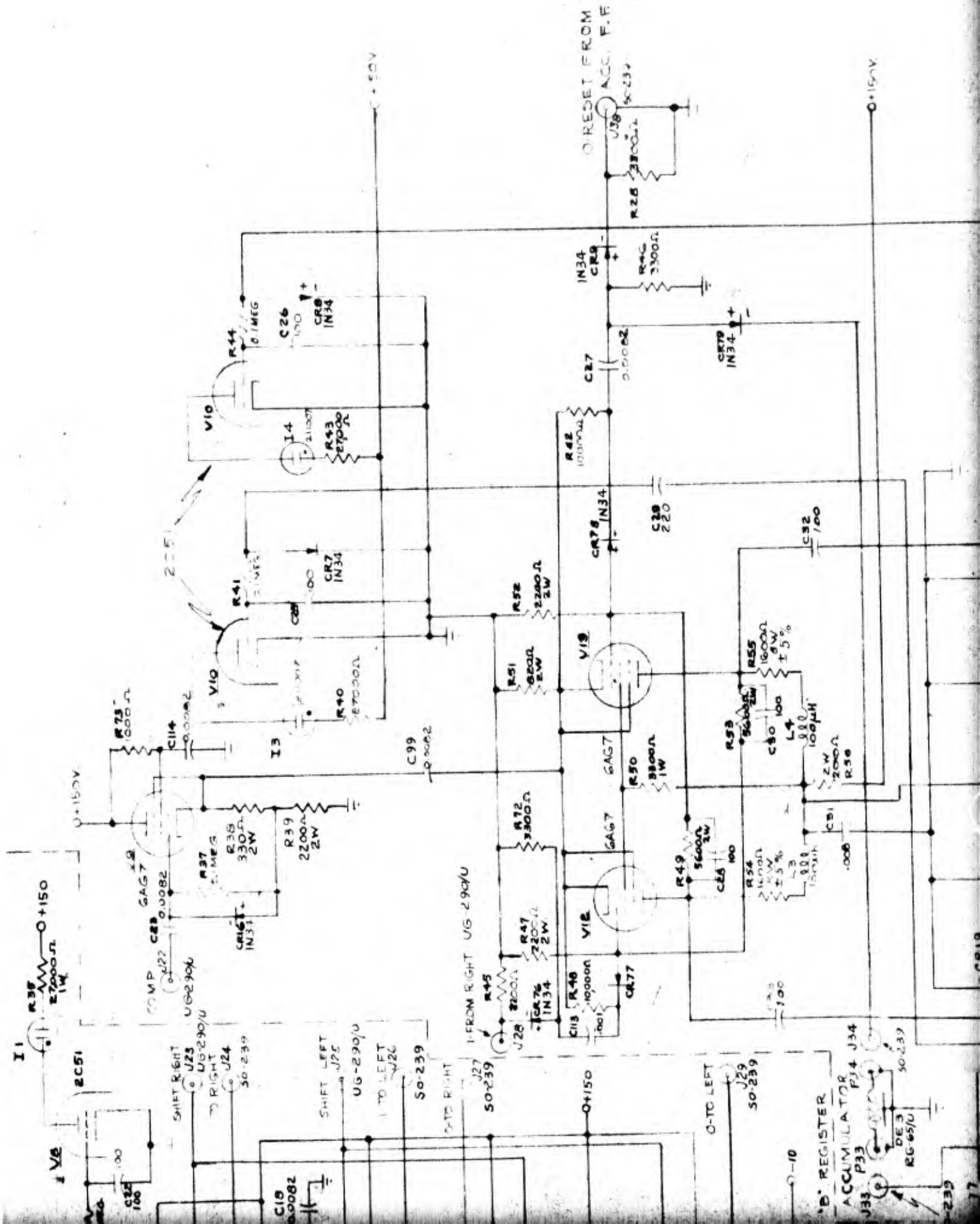
Sub Assemblies

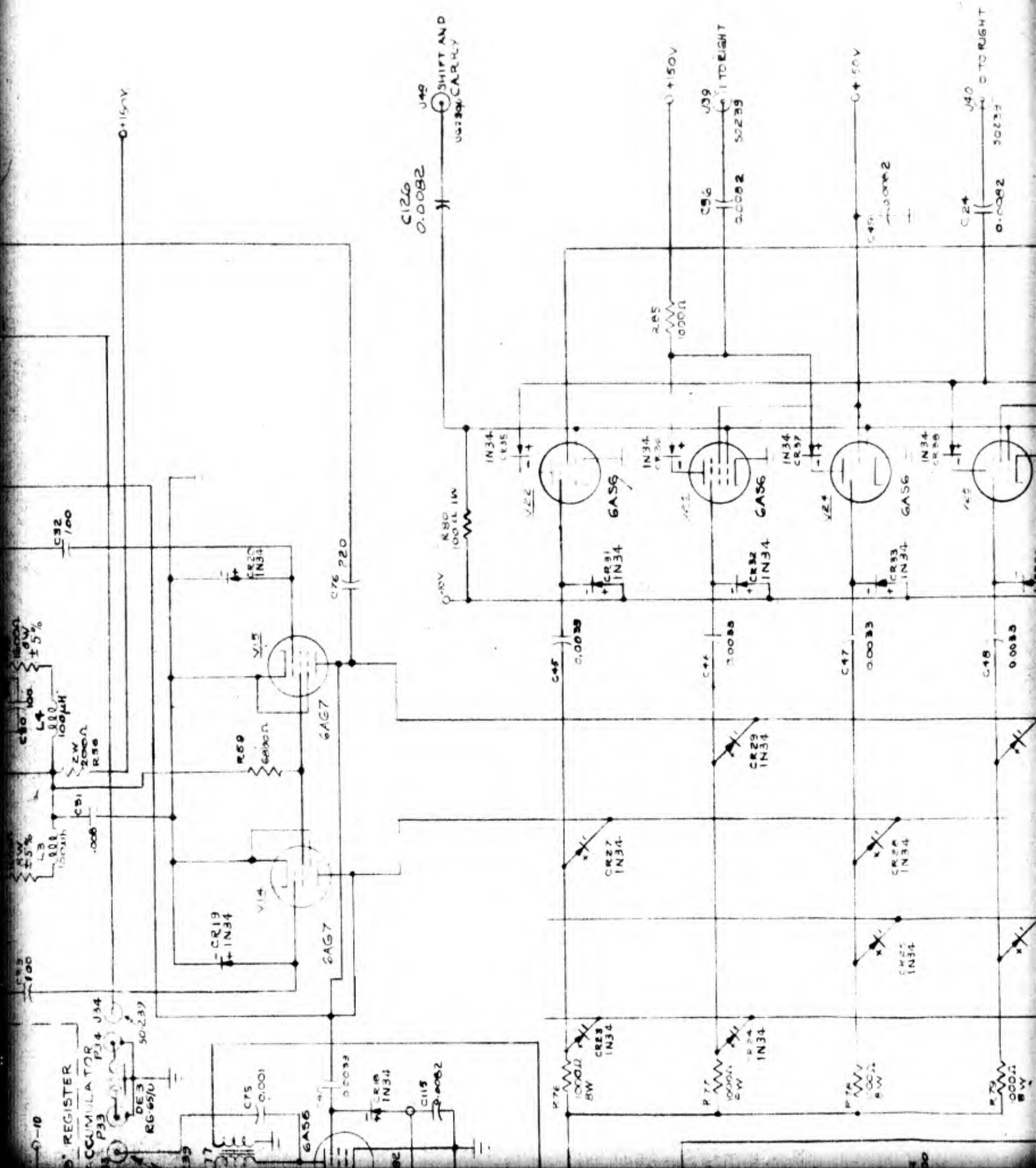
D-30875
D-30849
C-30866
A-30865
A-30840
D-30847
C-30867
D-30848
C-30868

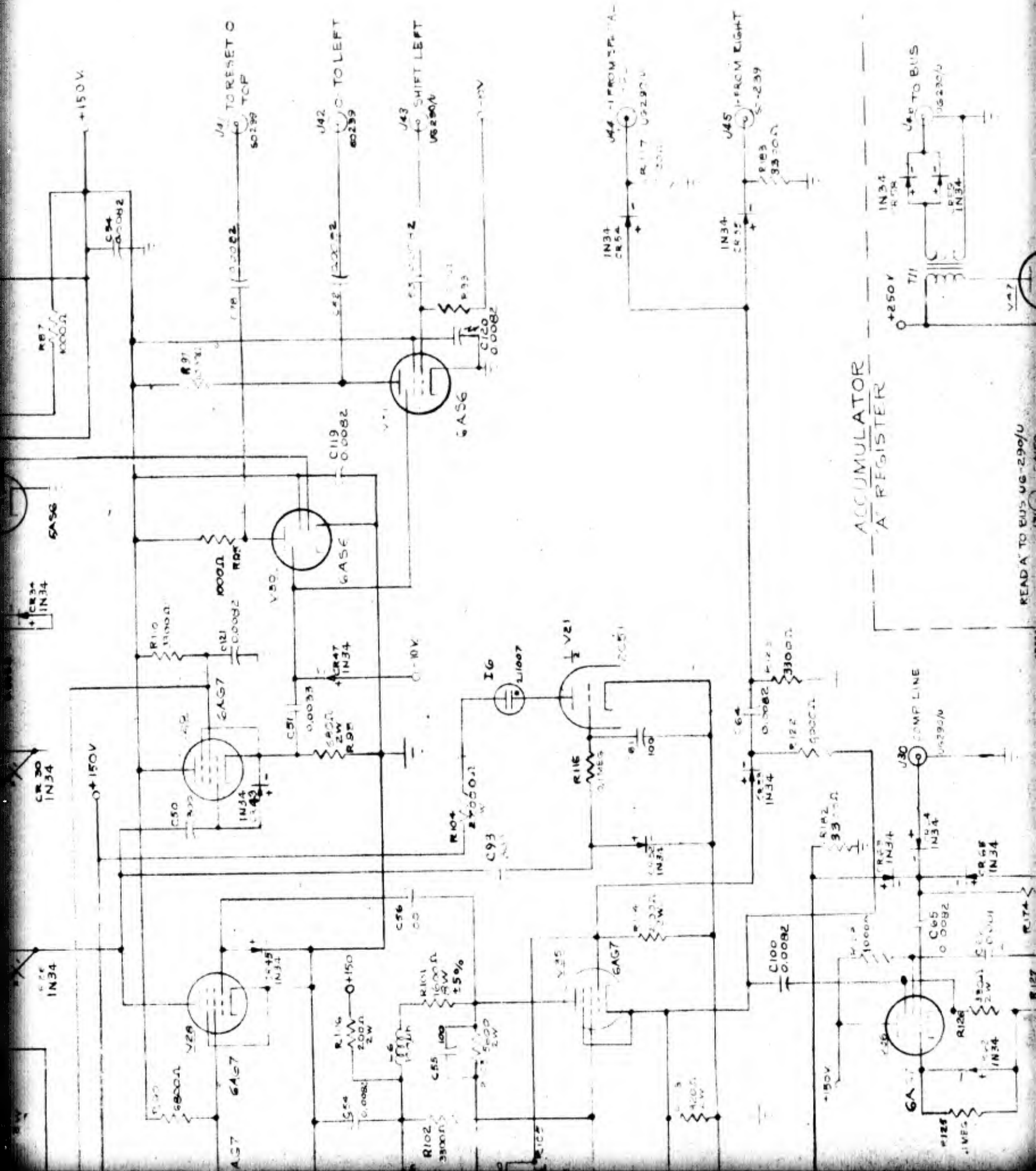


FB 267



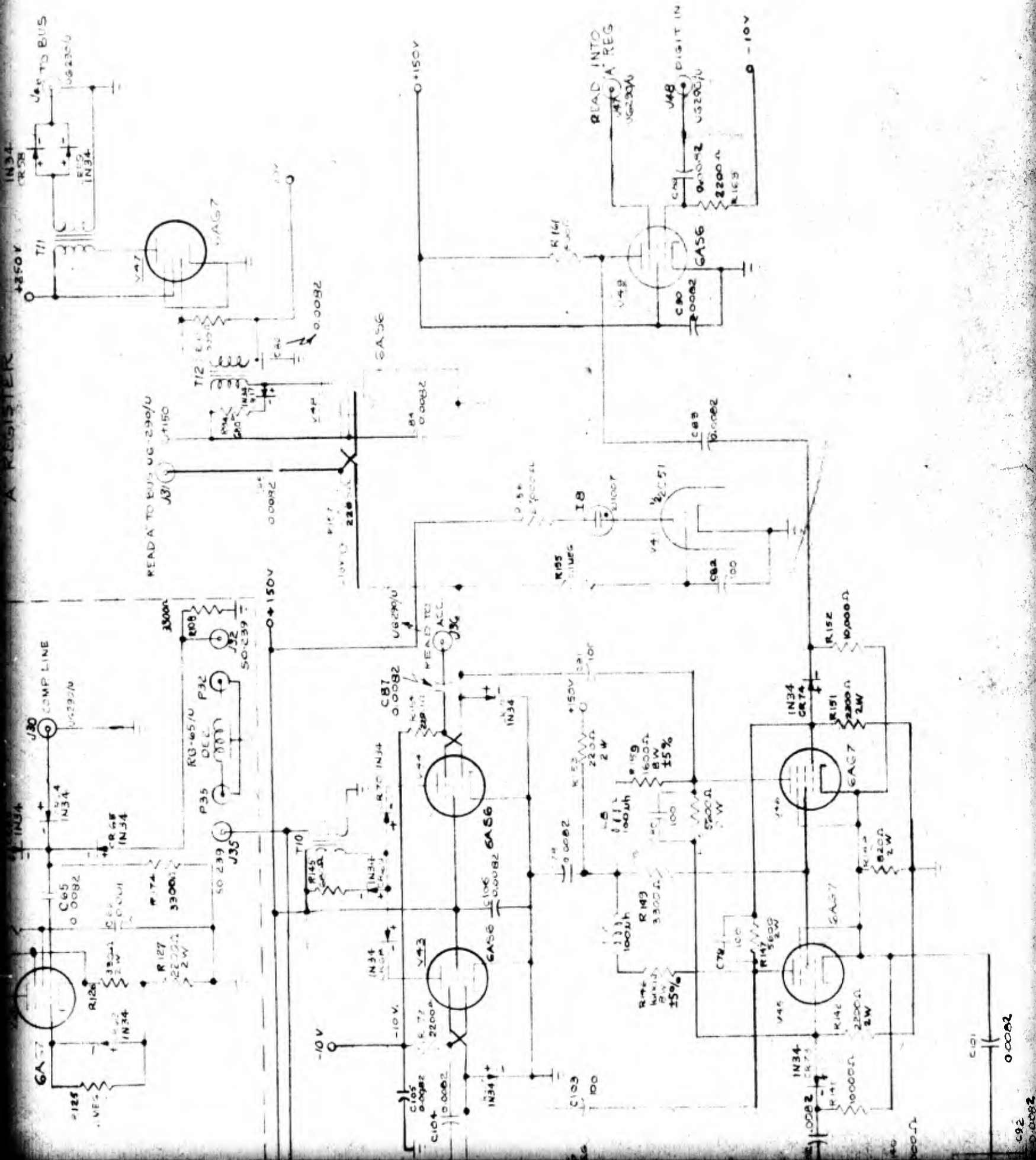


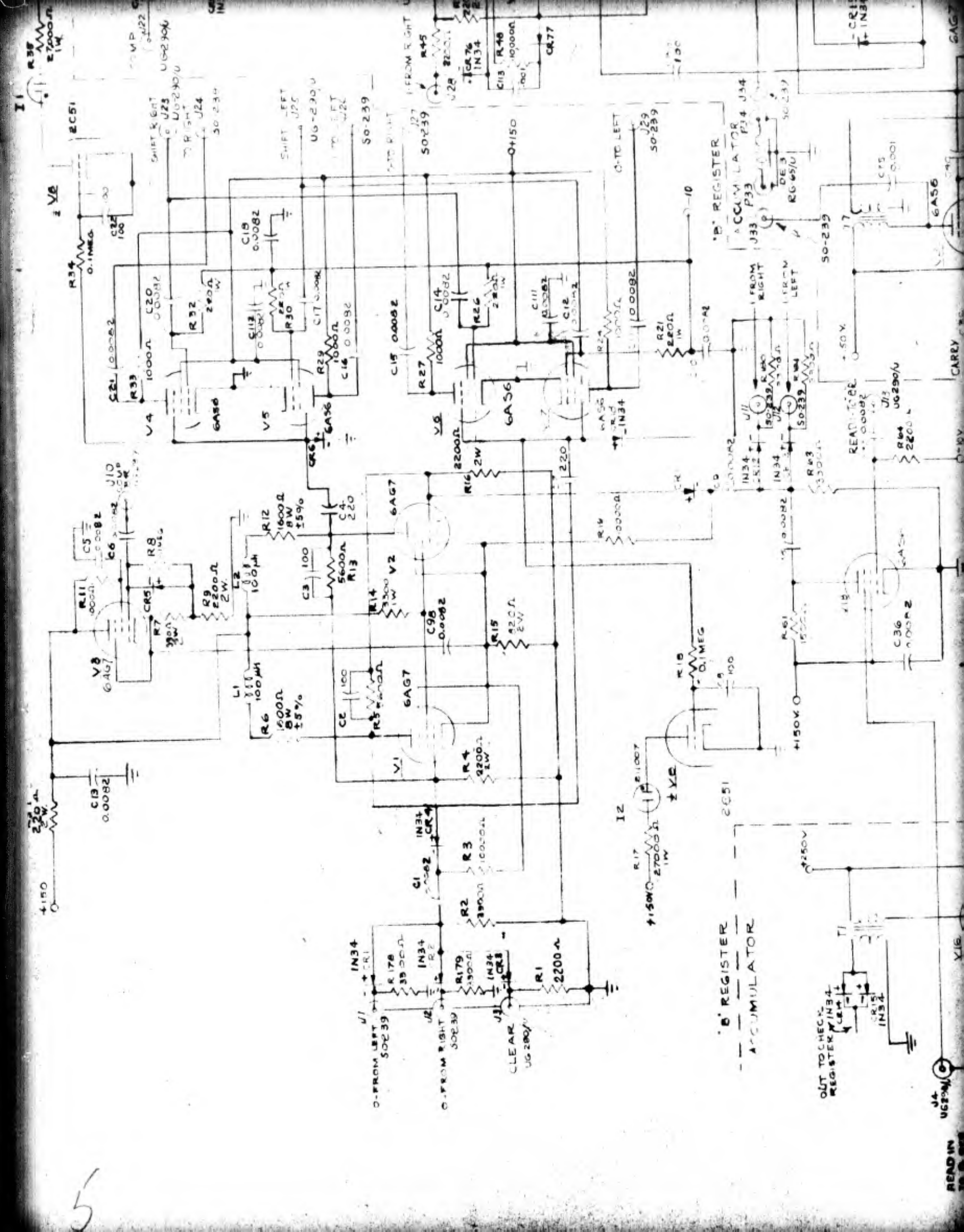


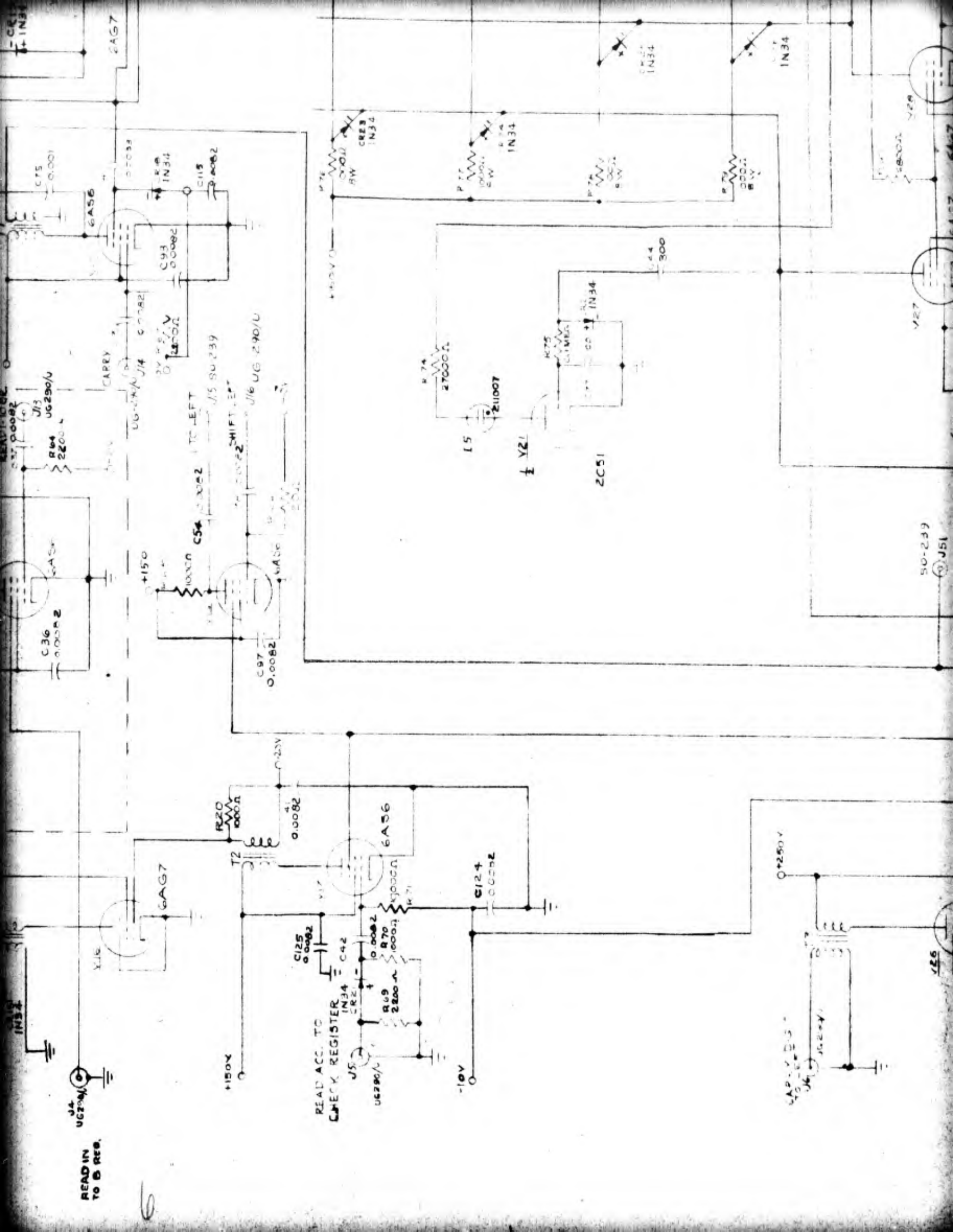


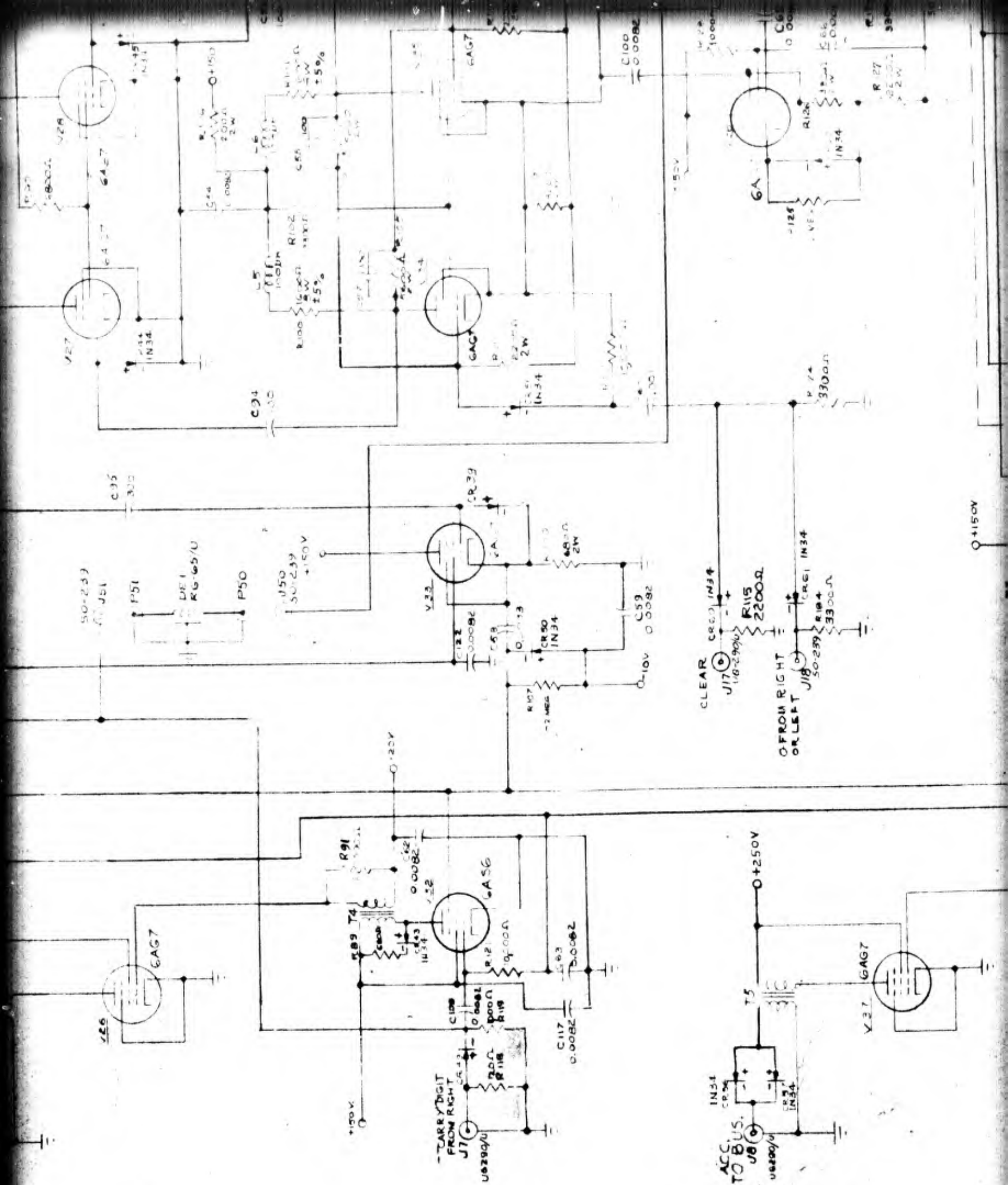
ACCUMULATOR A REGISTER

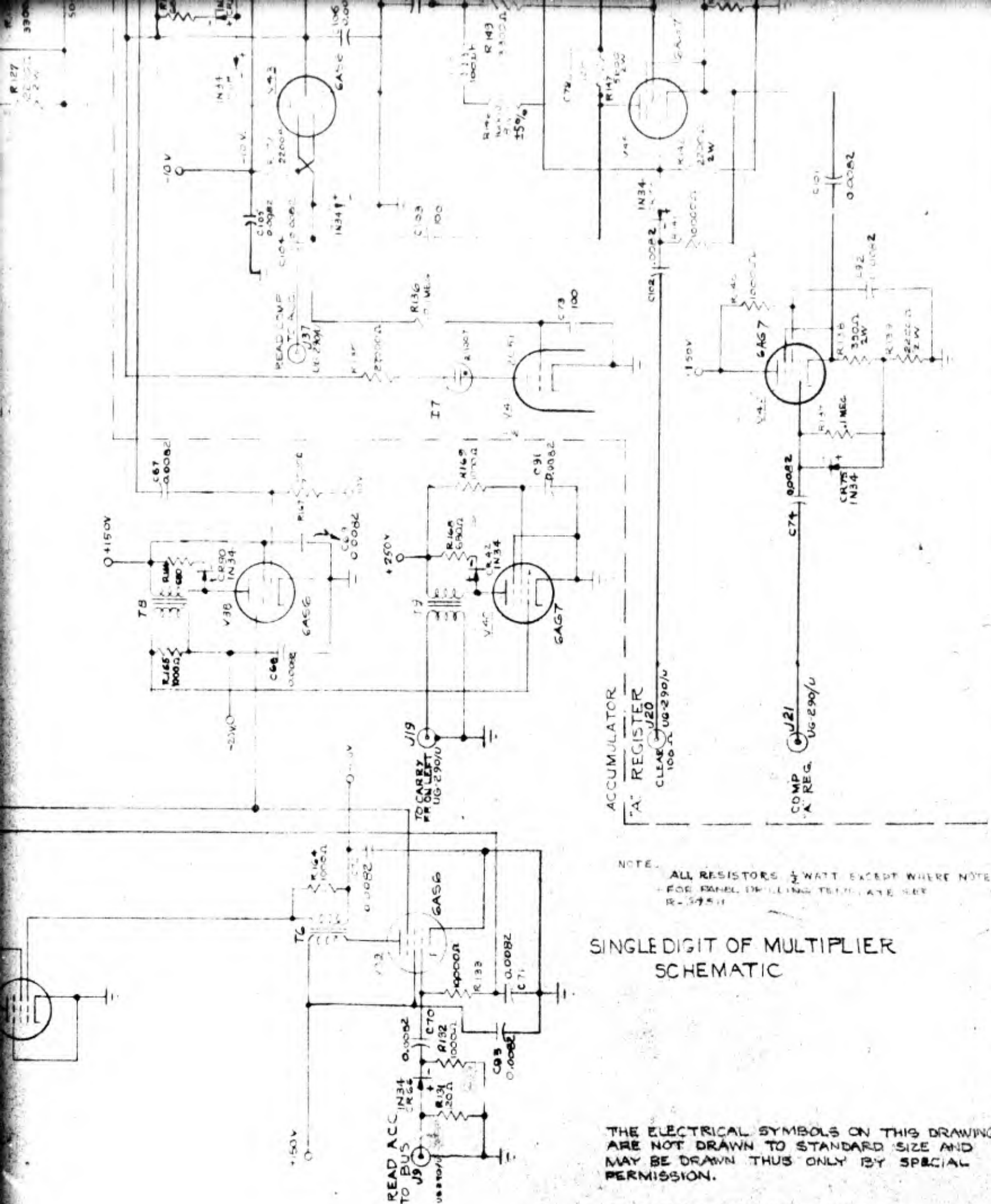
READ A TO BUS VG-290/U

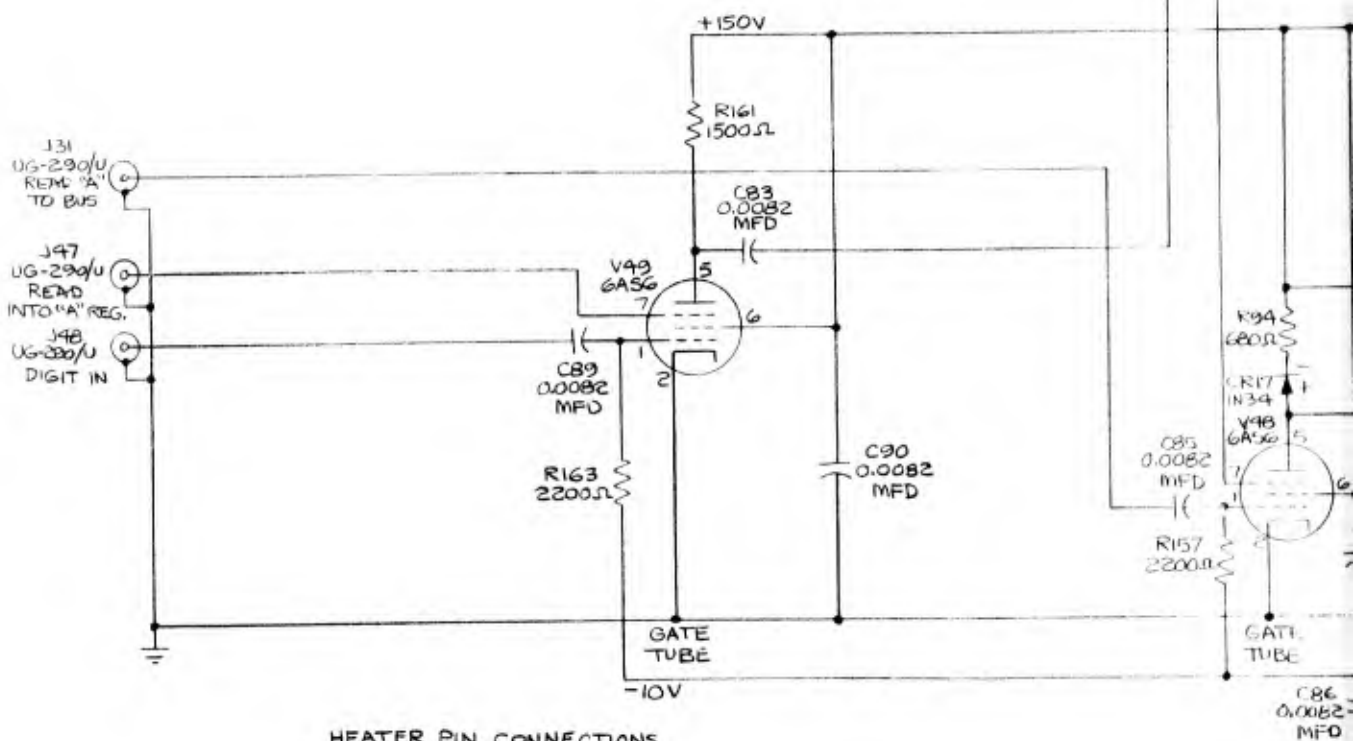
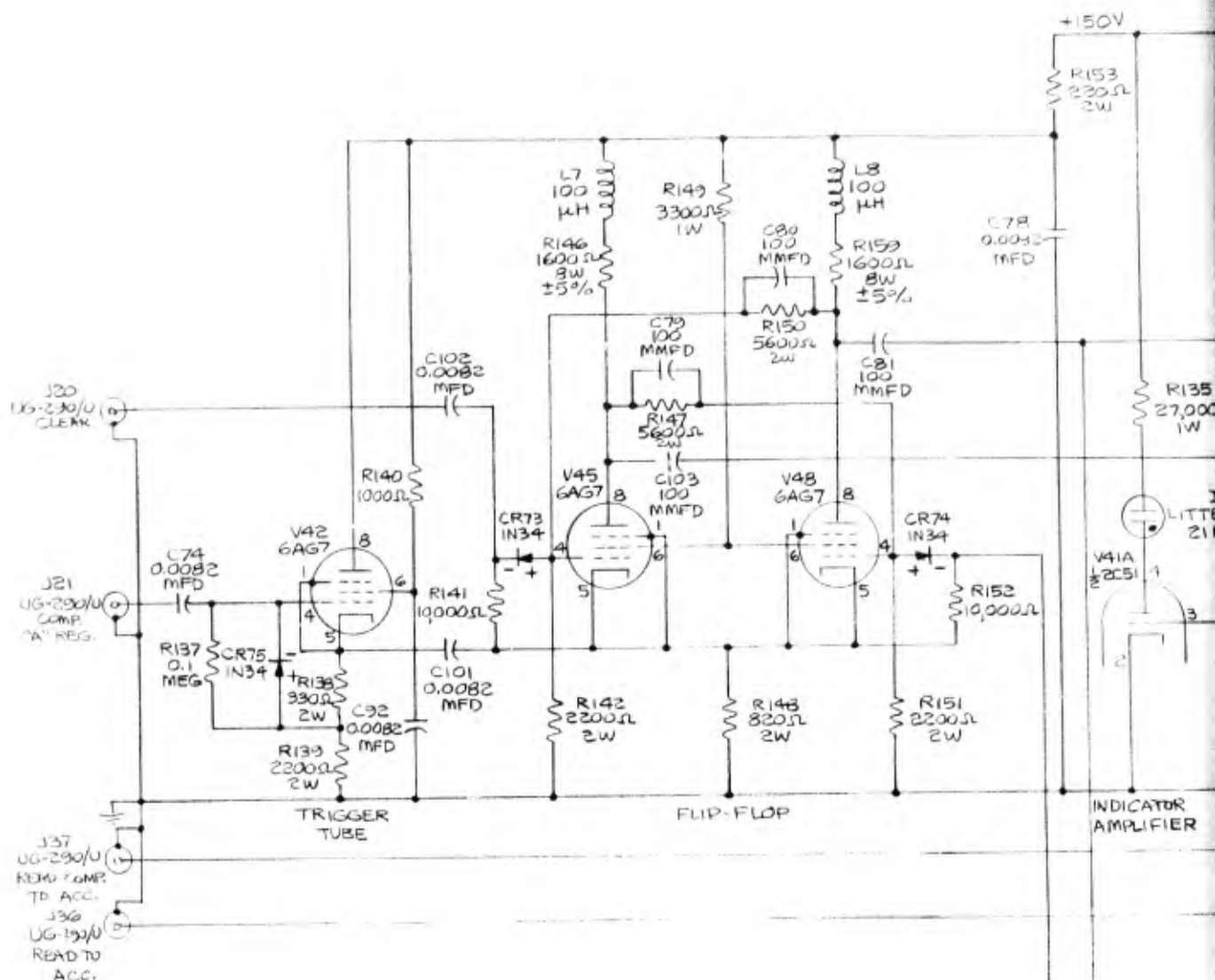








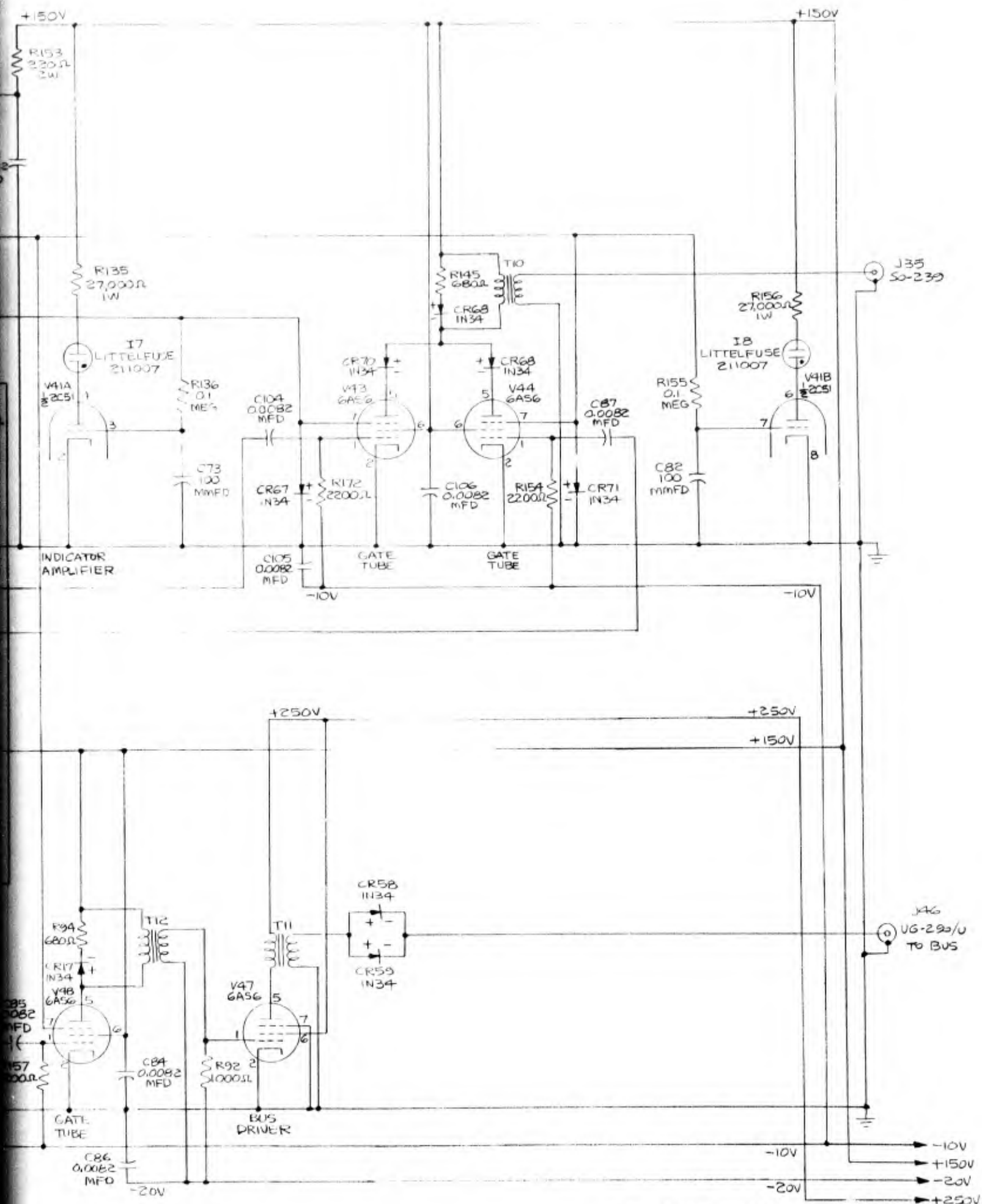




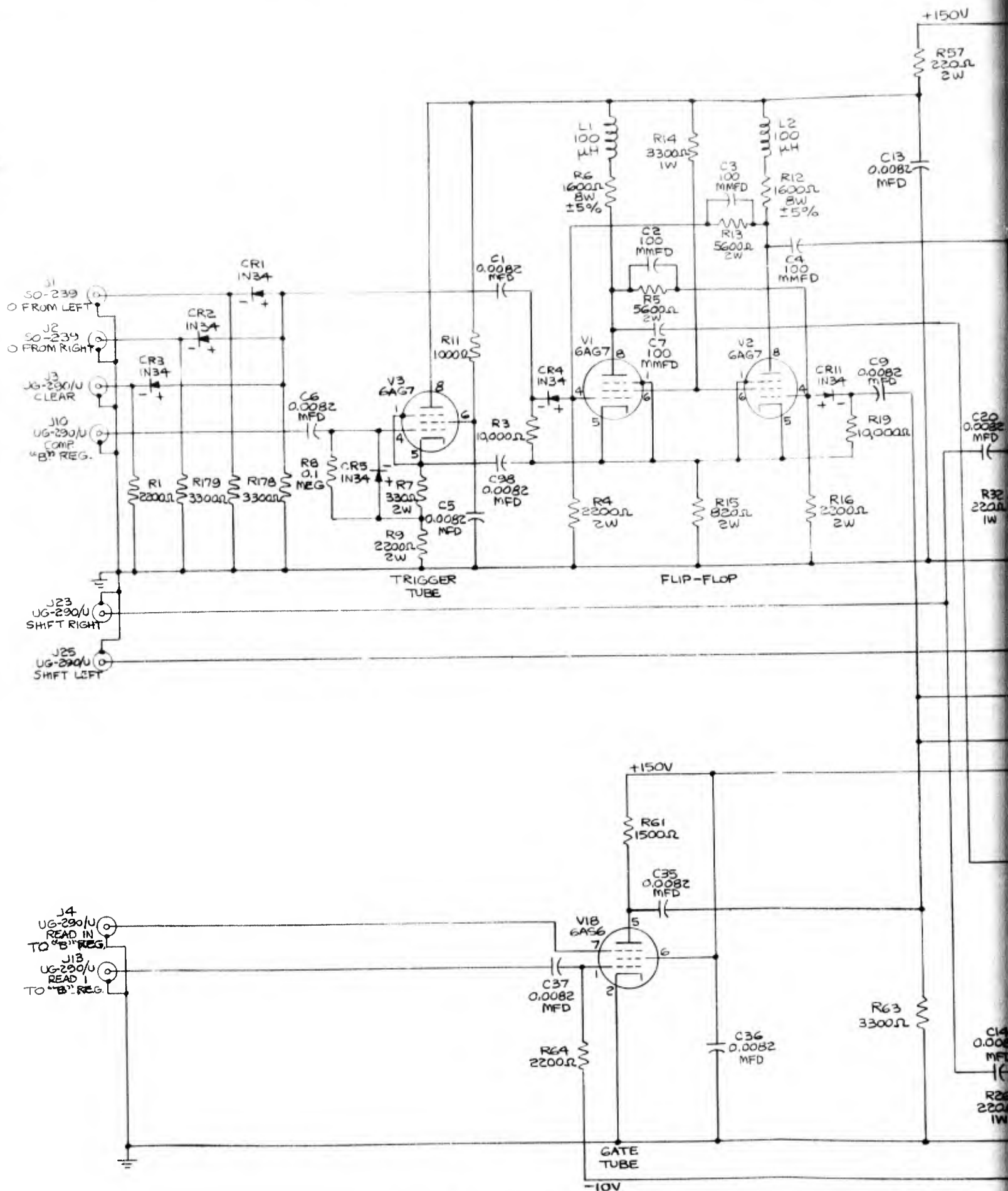
HEATER PIN CONNECTIONS

2C51: 1 & 9
 6AG7: 2 & 7
 6AS6: 3 & 4

NOTE: INTER-UNIT SHIELD, PIN 5
 OF 2C51, IS GROUNDED.



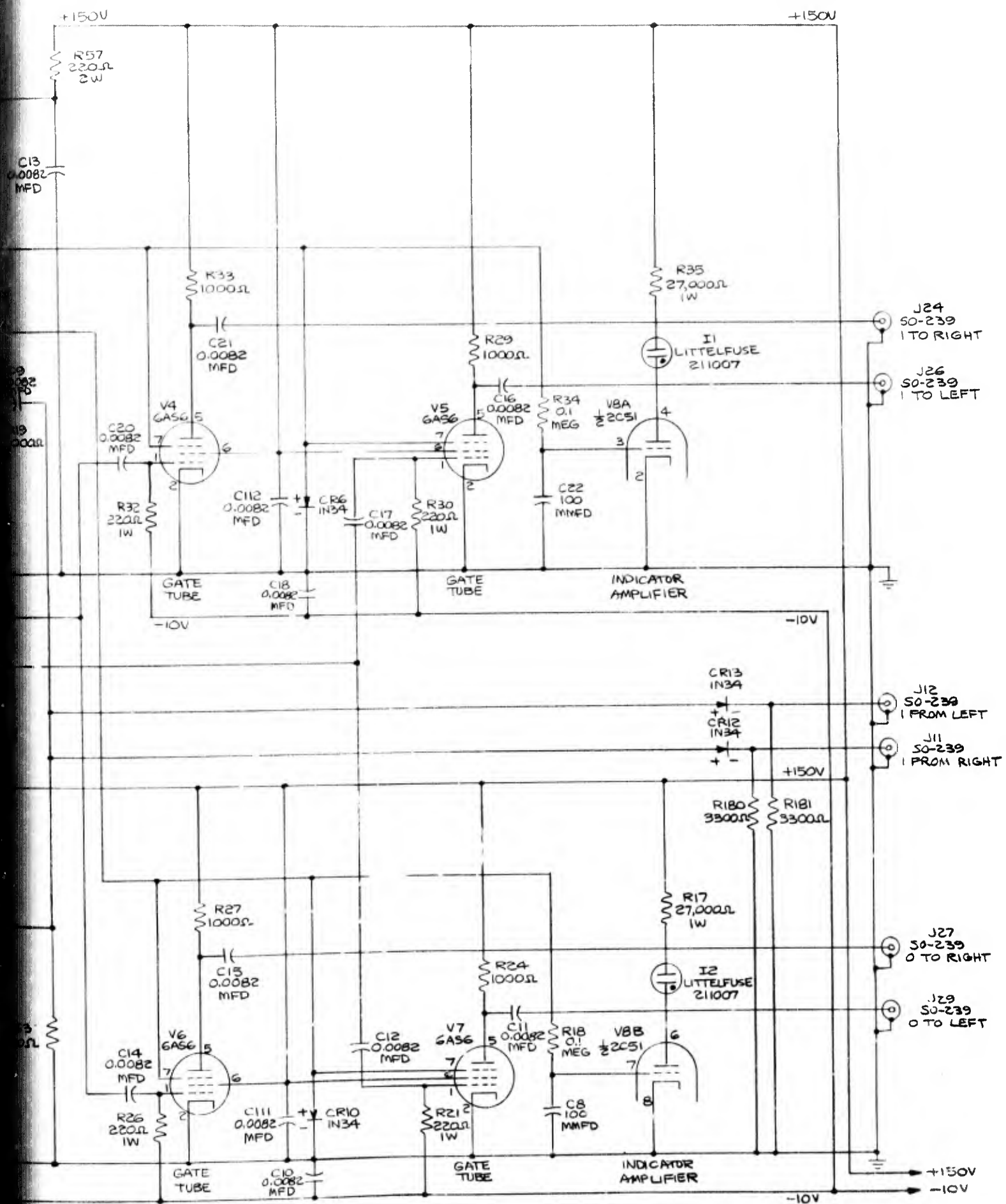
MULTIPLIER "A"
REGISTER SCHEMATIC 6345 1 TL 317/47 SD-39335



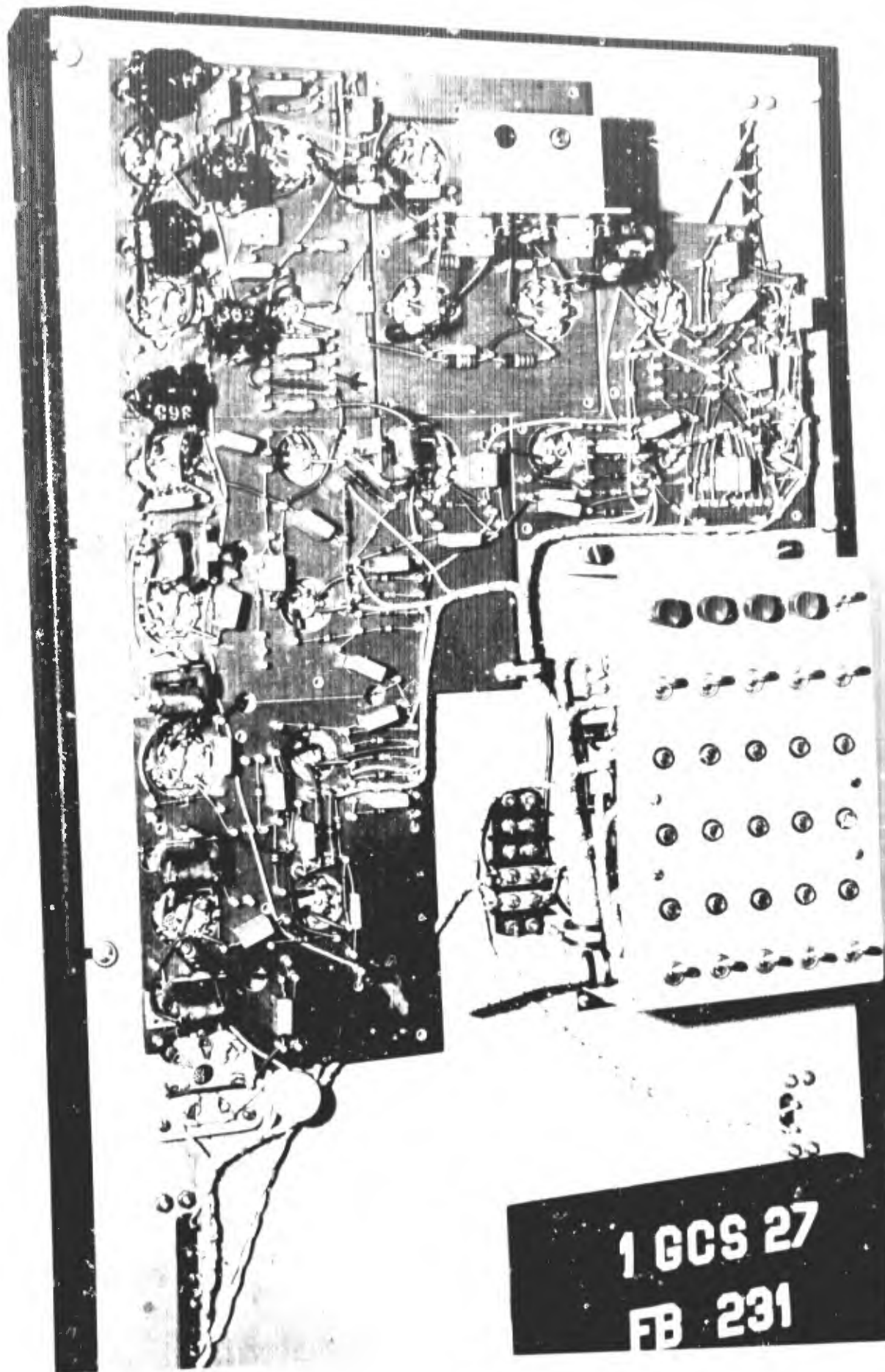
HEATER PIN CONNECTIONS

2C51: 1 & 9
6AG7: 2 & 7
6AS6: 3 & 4

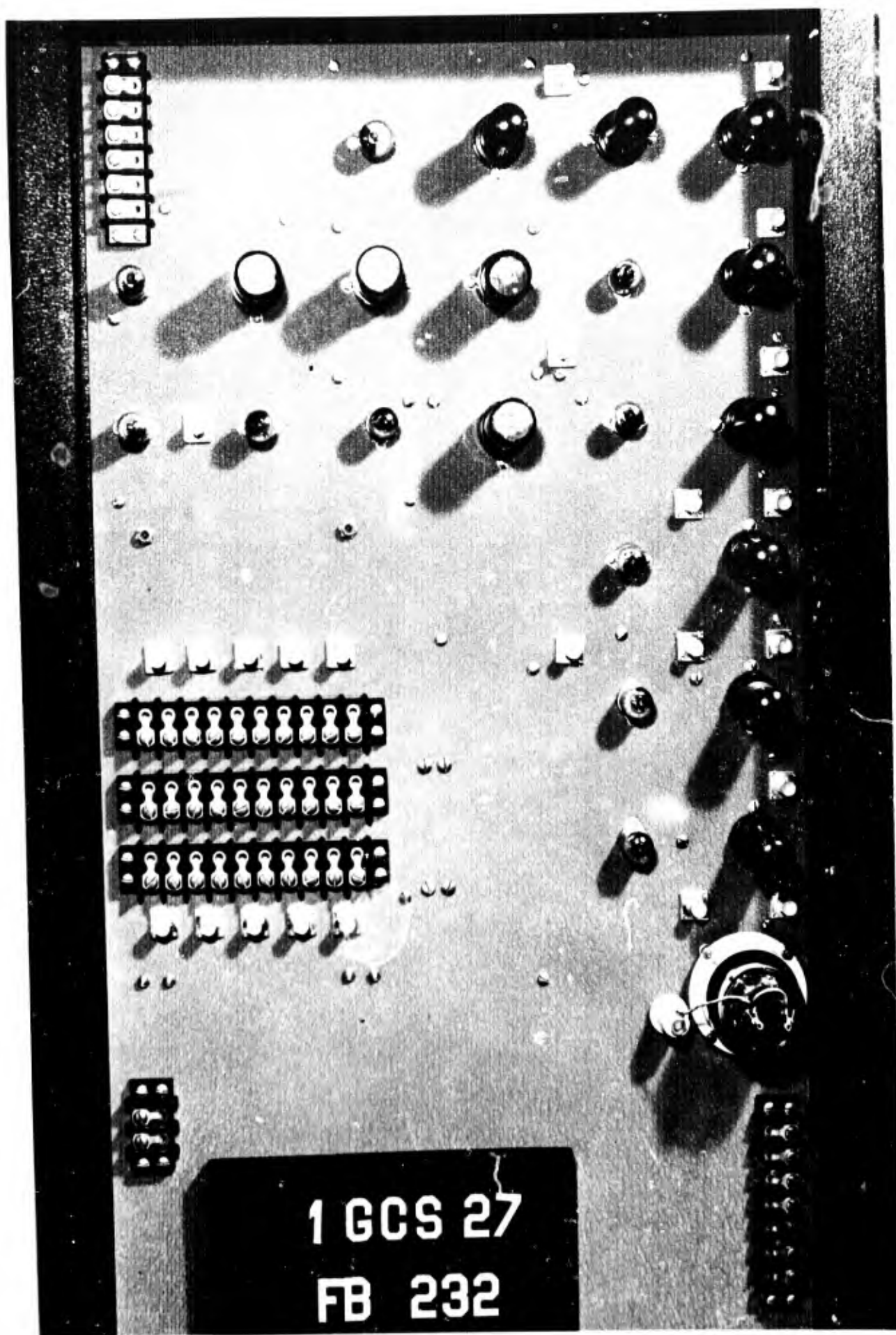
NOTE: INTER-UNIT SHIELD, PIN 5
OF 2C51, IS GROUNDED.



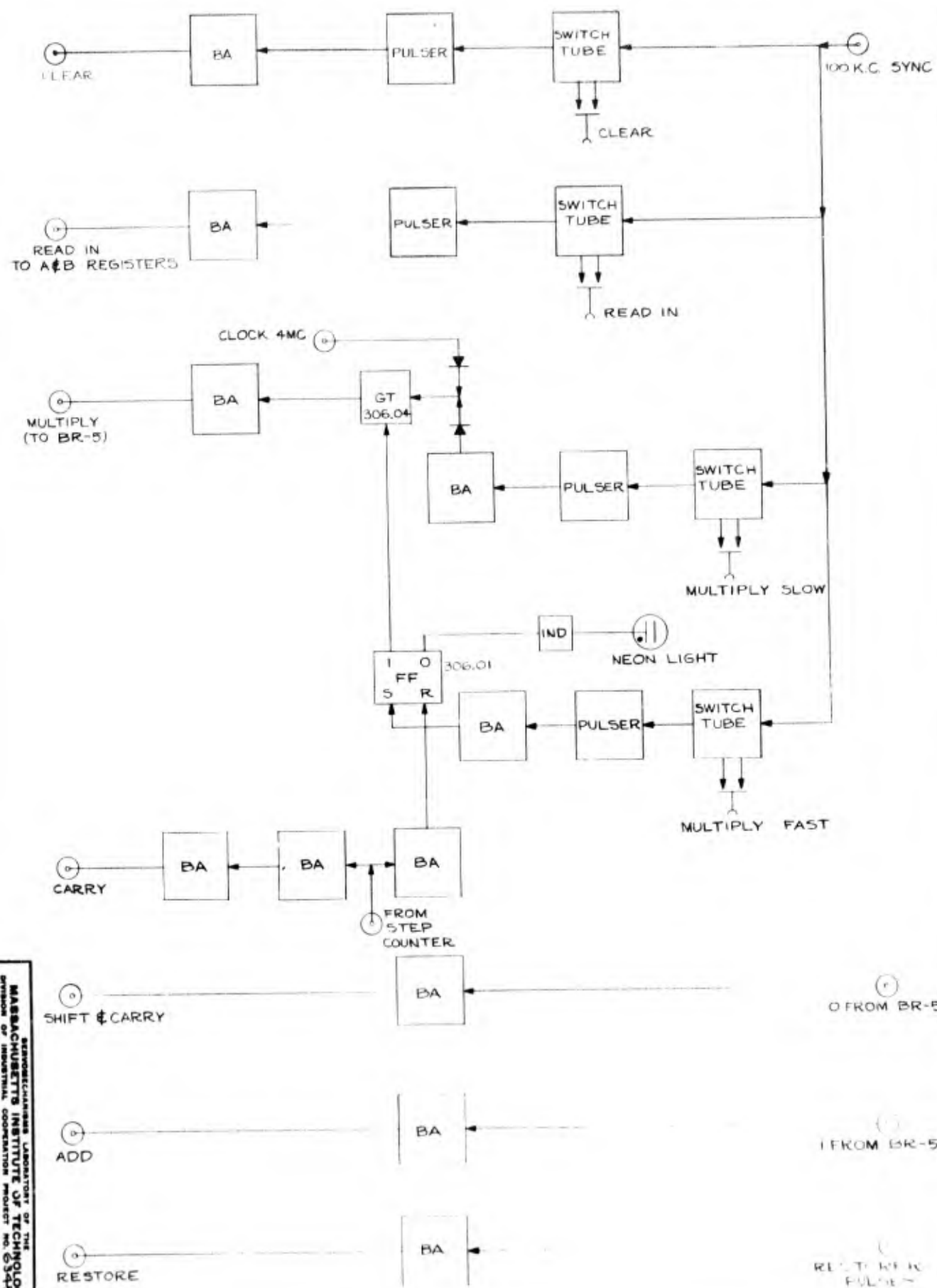
MULTIPLIER "3" REGISTER SCHEMATIC

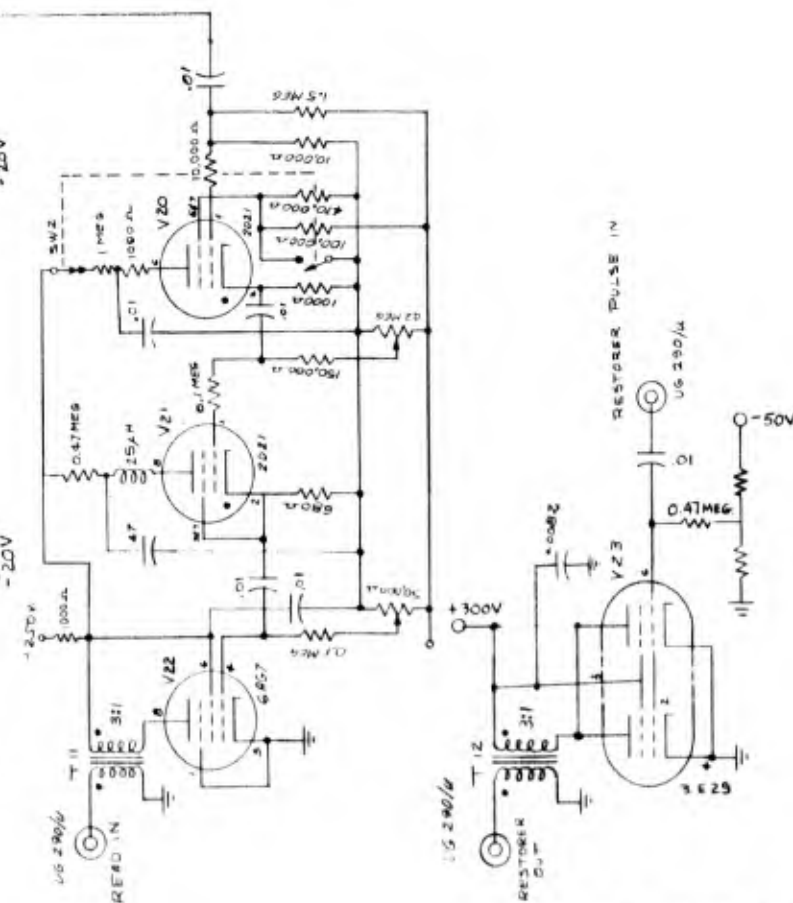
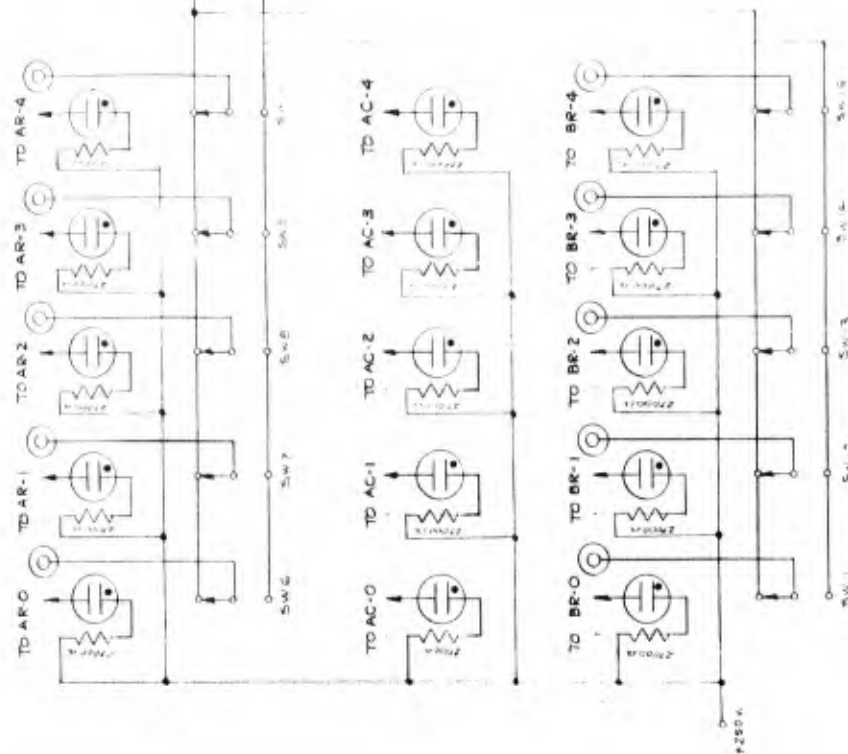
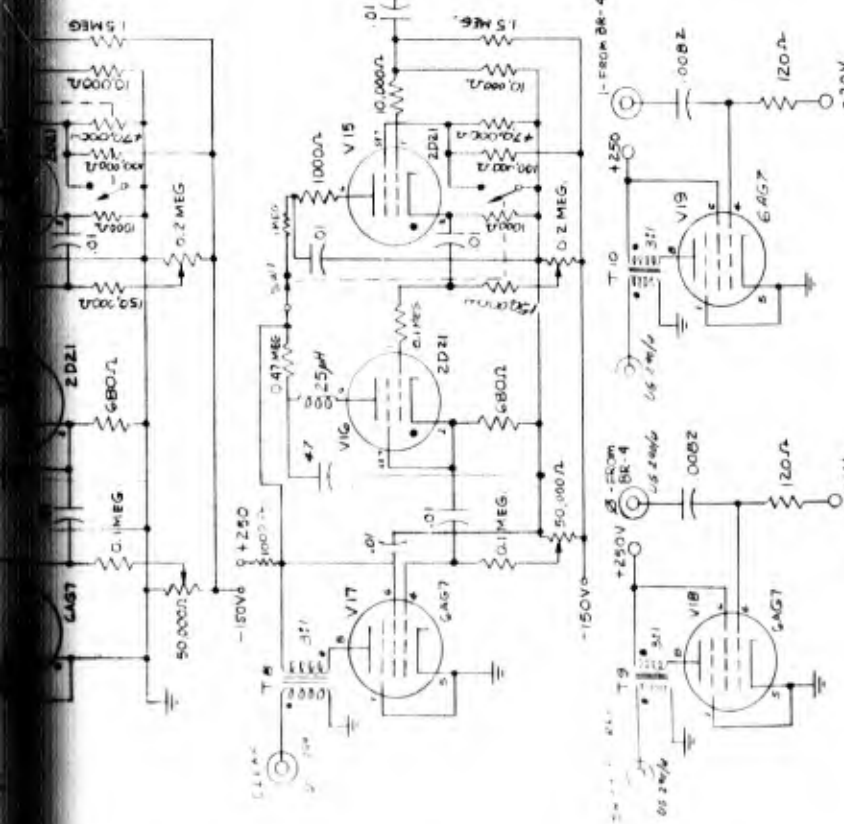


1 GCS 27
FB 231



1 GCS 27
FB 232



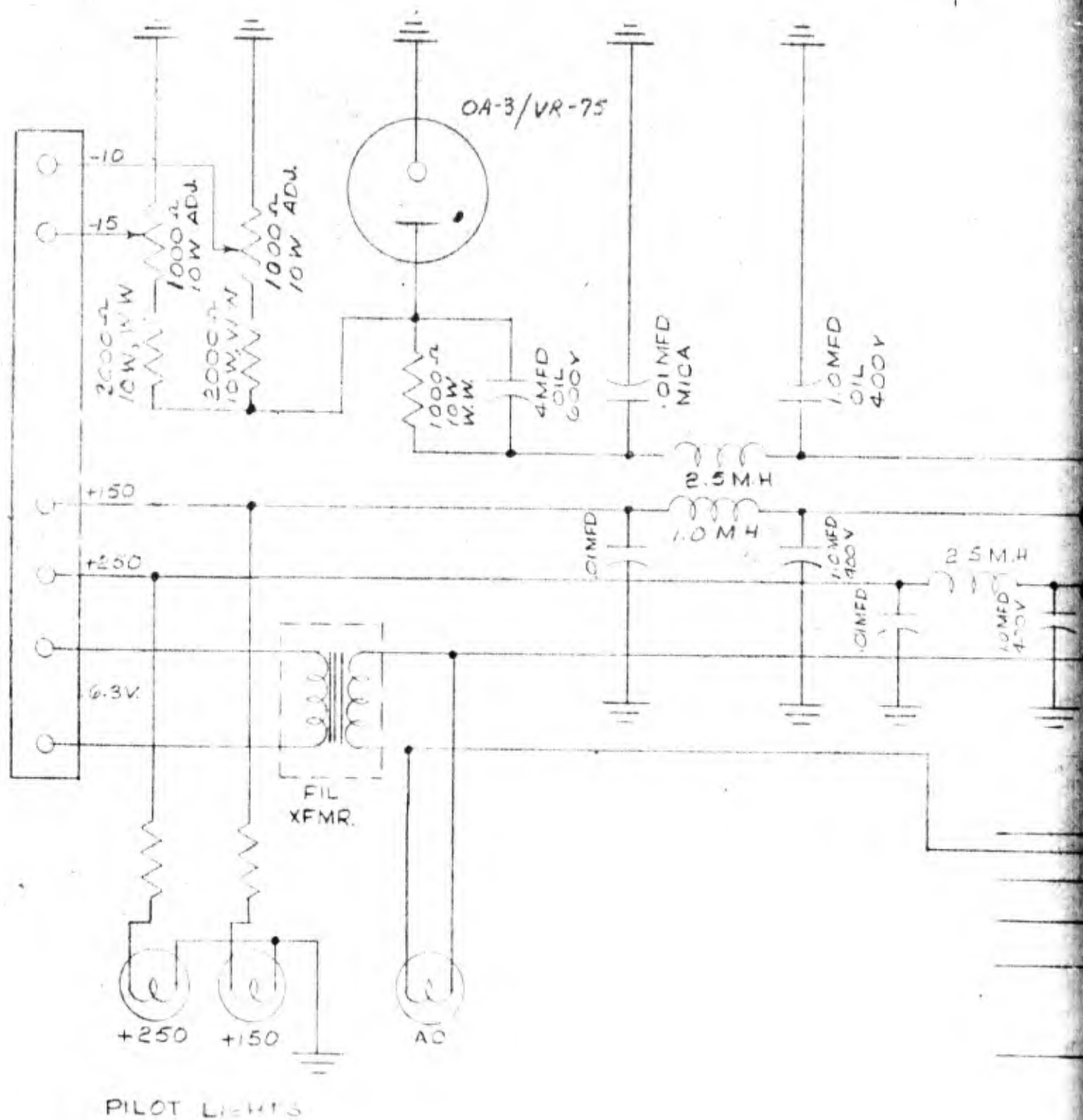


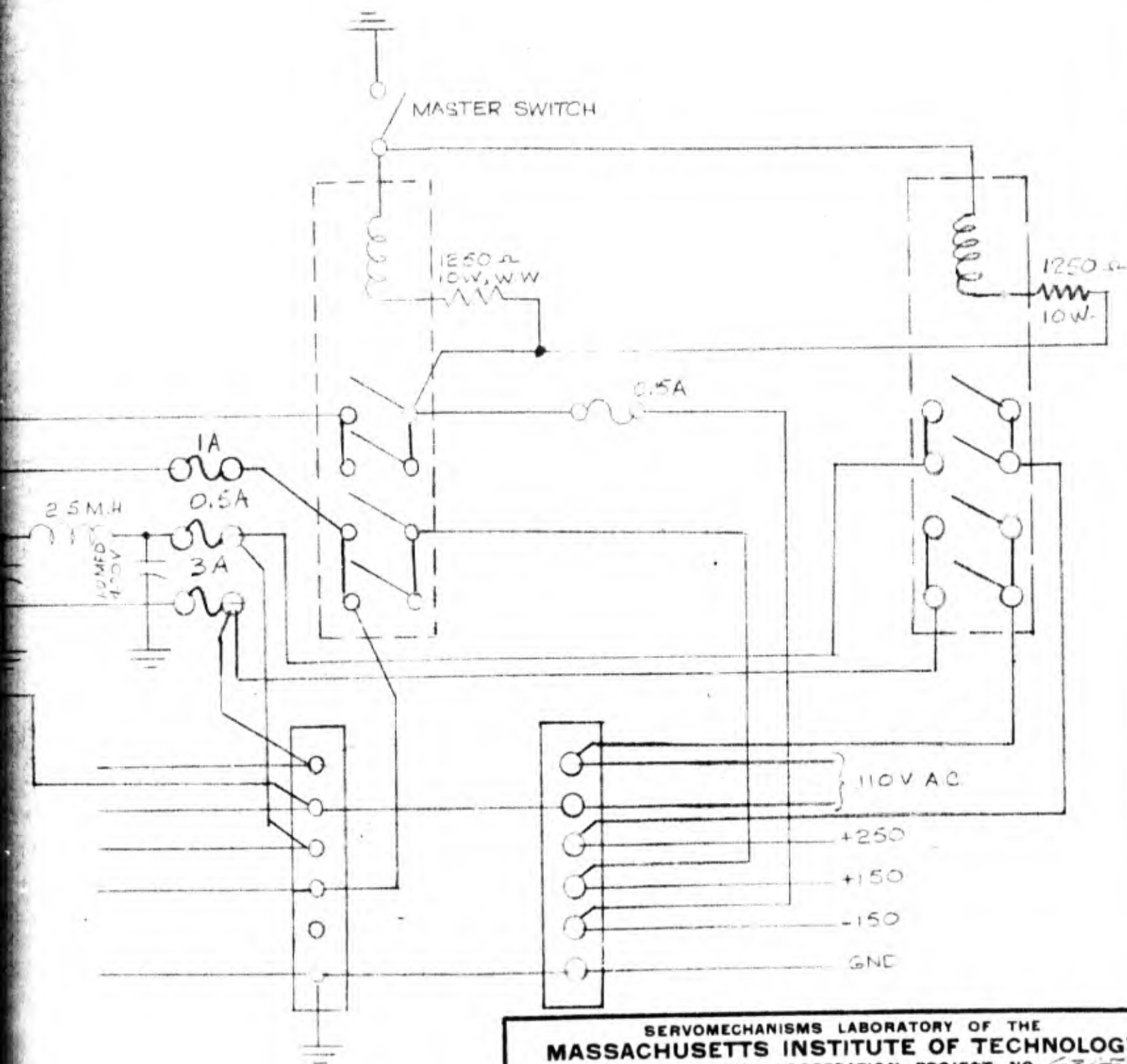
6305
GCS

Approved
ST-47

SD-39318

SB-39328-1





SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

SCHEMATIC - POWER PANEL FOR 5-DIGIT
 MULTIPLIER CONTROL RACKS

SCALE:

DR. McCulloch

ENG.

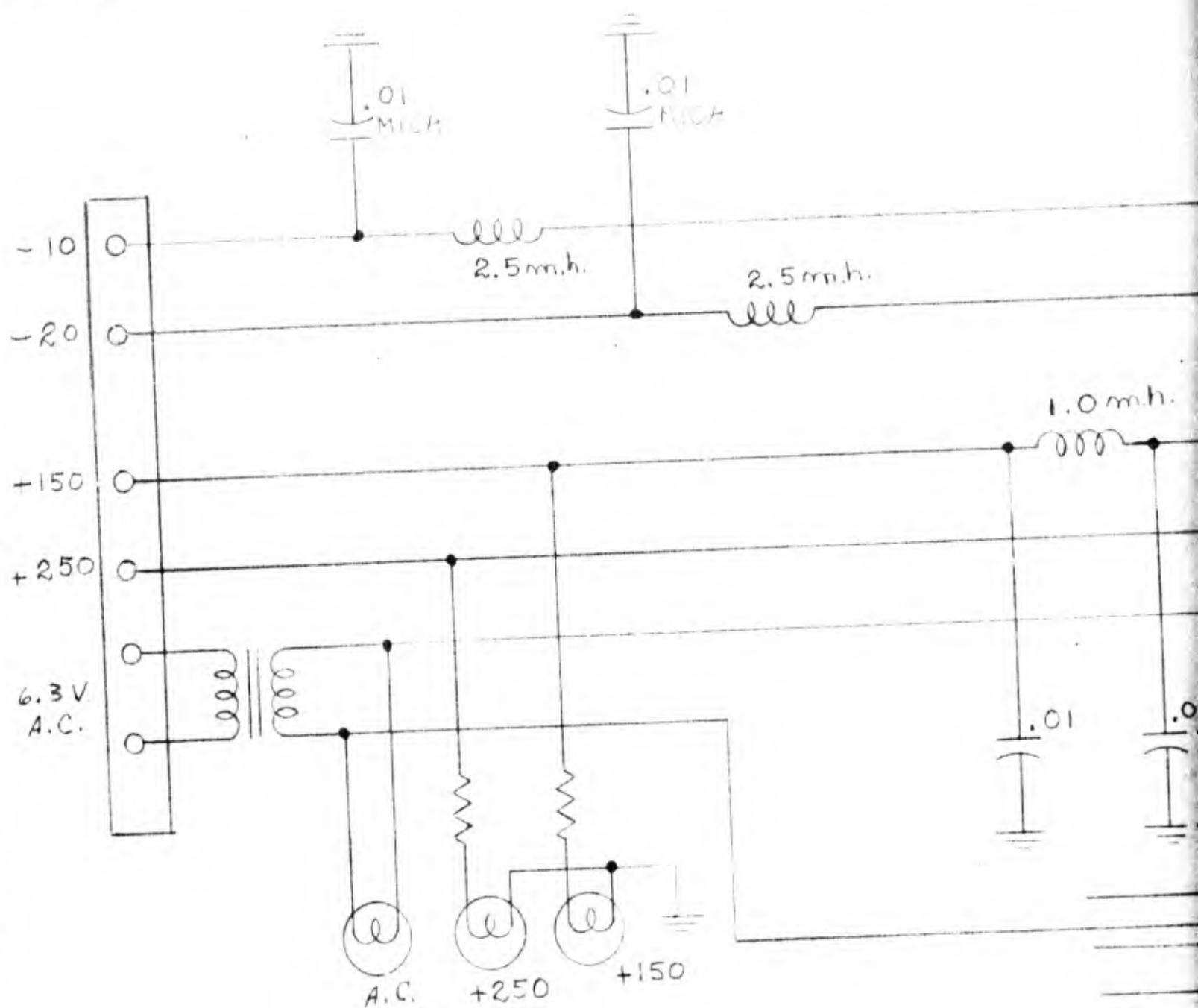
C.W.W. 8/23/50

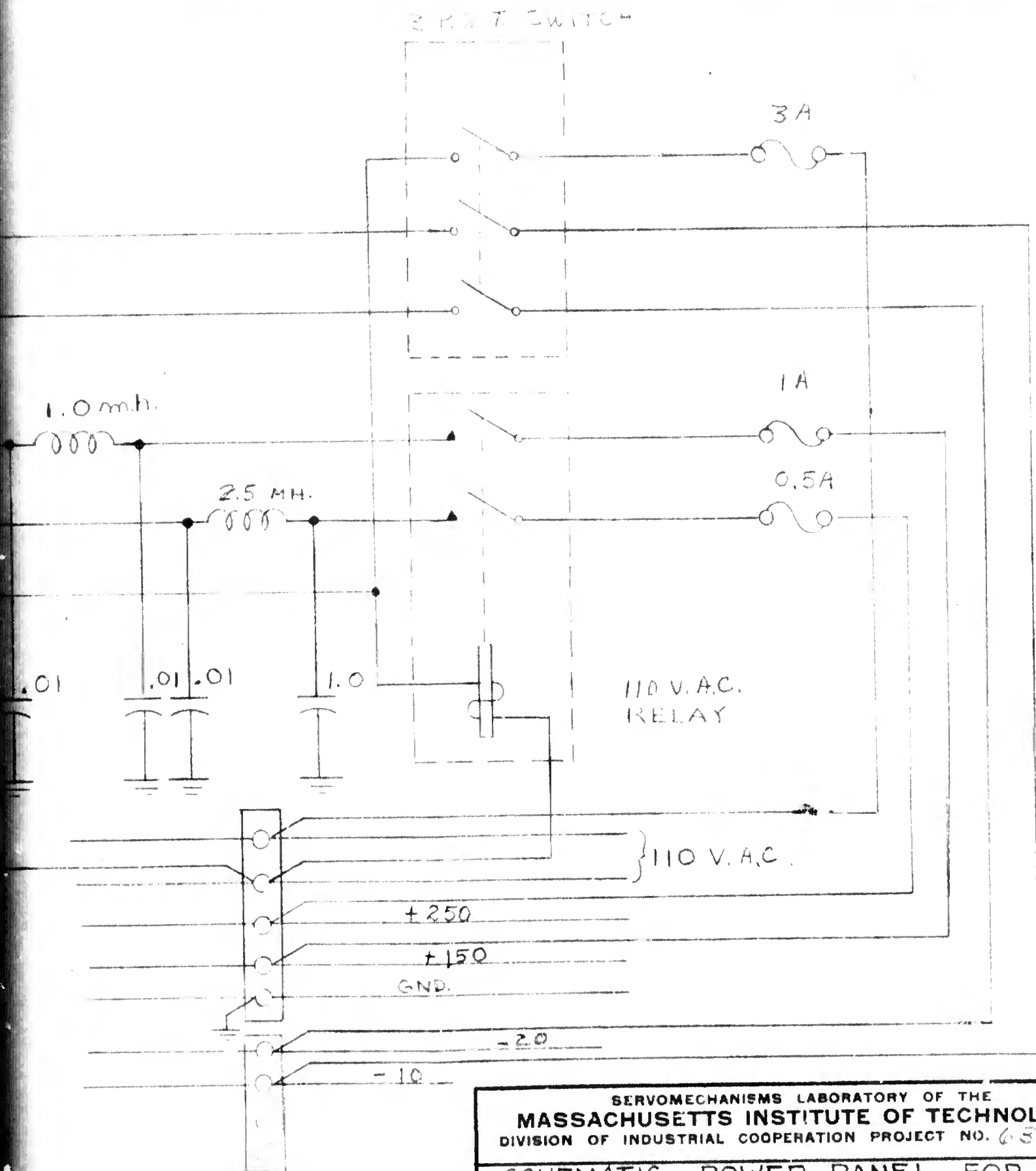
CK.

APP.

SB-39328-1

SB-39334





SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

**SCHEMATIC - POWER PANEL FOR
 5 DIGIT MULTIPLIER DIGIT RACKS**

SCALE: -

DR WOLLEY

ENG

C.W. 9-10-47

CK.

APP.

SB-39334

3 DRILL & HOLES

2 PIVETER COM

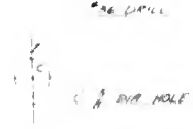
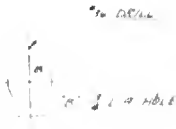
14 REGISTER COMPONENT PANEL OUTLINE

ACCUMULATOR COMPONENT PANEL OUTLINE

GATE & BUFFER AMPLIFIER PANEL OUTLINE

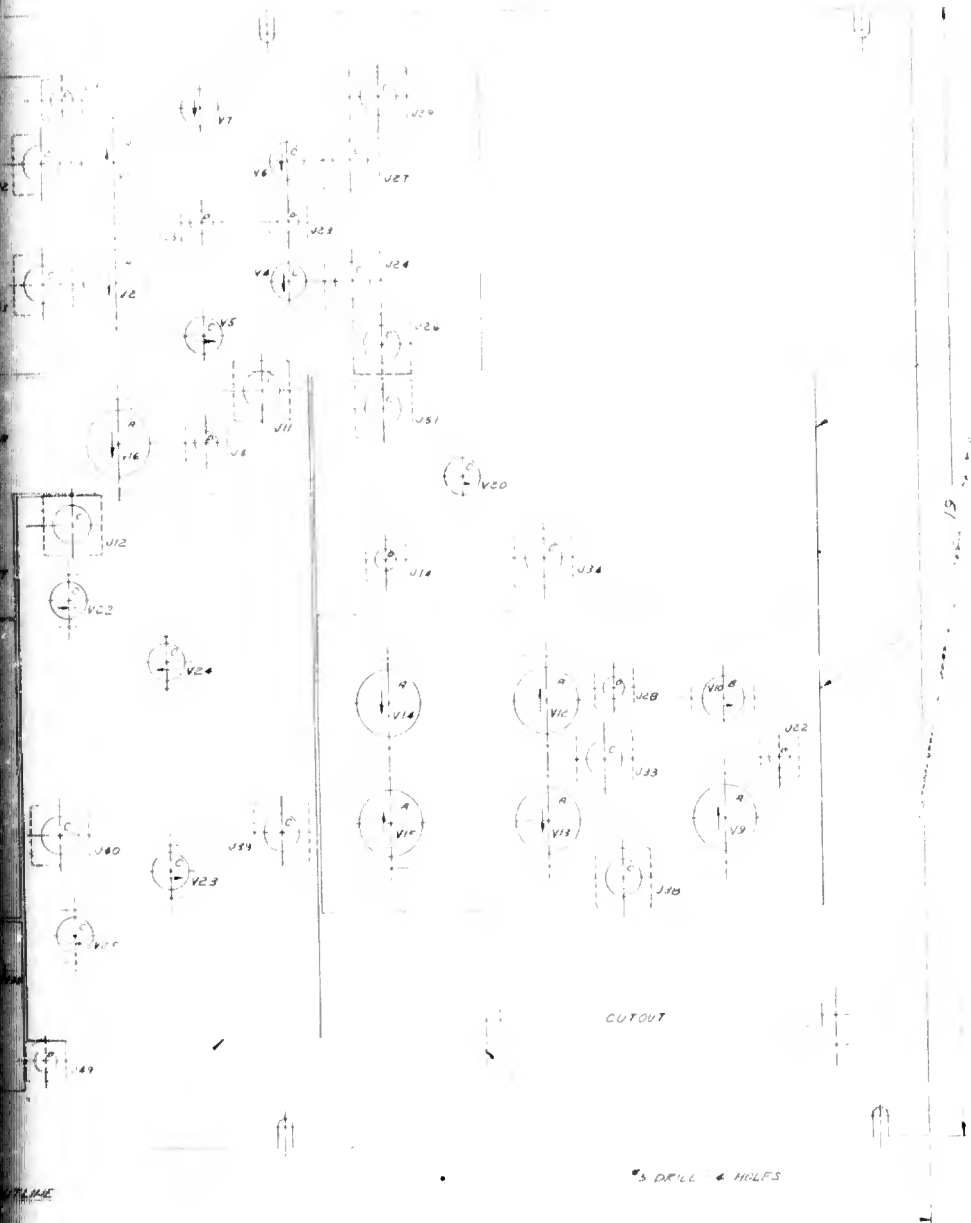
ACCUMULATOR COMPONENT PANEL OUTLINE

31 1/2



FF COMPONENT PANEL OUTLINE

FF COMPONENT PANEL OUTLINE



GATE & BUFFER AMPLIFIER PANEL #2 OUTLINE

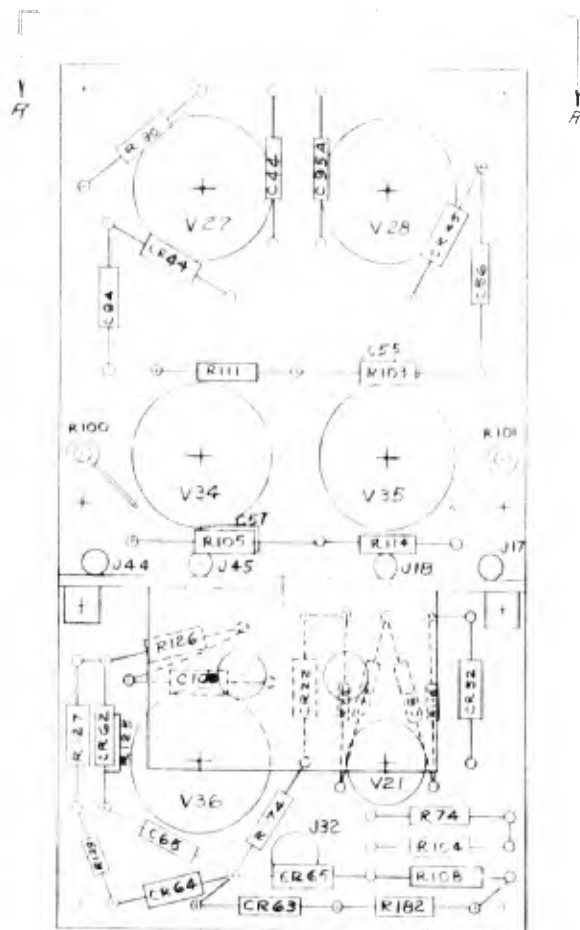
CARRY FF COMPONENT PANEL OUTLINE

MATERIAL - 1/8 ALUMINUM
 DRAWING - INDICATES DIRECTION OF KEY

0.008 DIA HOLE

DRILLING CHARTS
 DRILLING TEMPLATE
 FILE NO. 61081200
 R-37511

D-37512

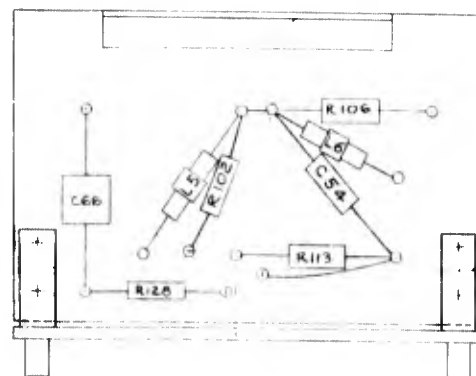


PANEL #1

PANEL #2

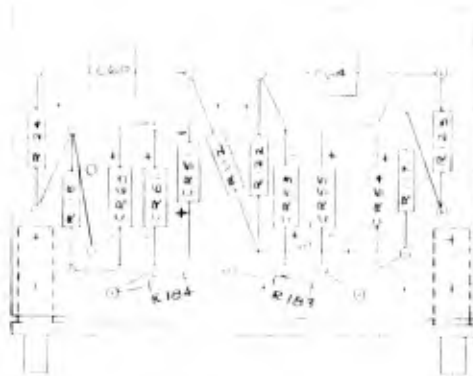
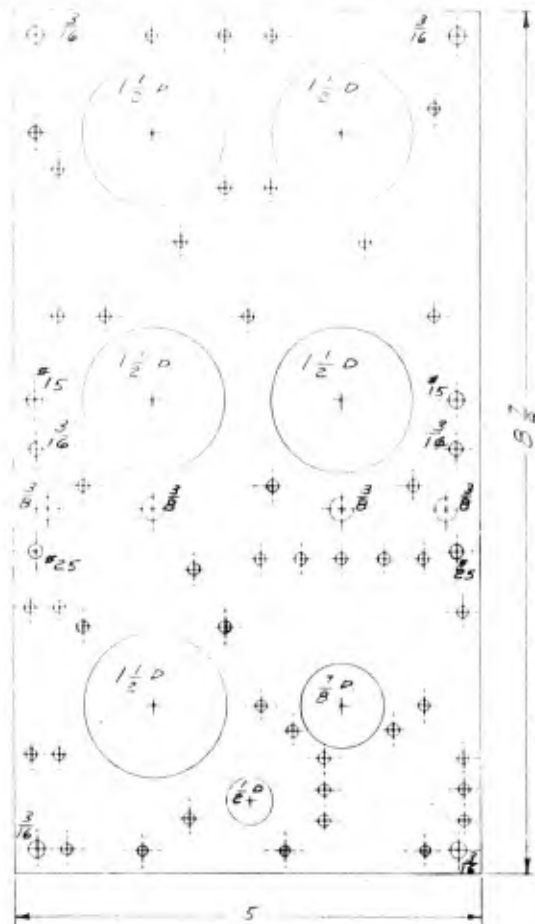
IND. MTG PANEL

NOTE - "V" & "J" NUMBERS ARE FOR REFERENCE ONLY.



DRILLING TEMPLATES HOLES NOT NOTED DRILL #33

PANEL #1 - $\frac{1}{8}$ THK PHENOLITE OR EQUAL

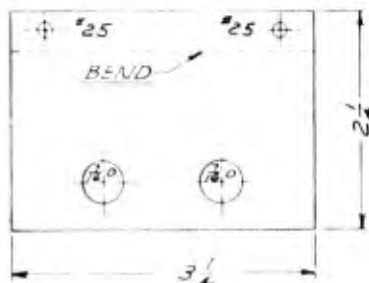


VIEW (LPRIGHT) A-A SHOWING
COMPONENT ASSY PLAN

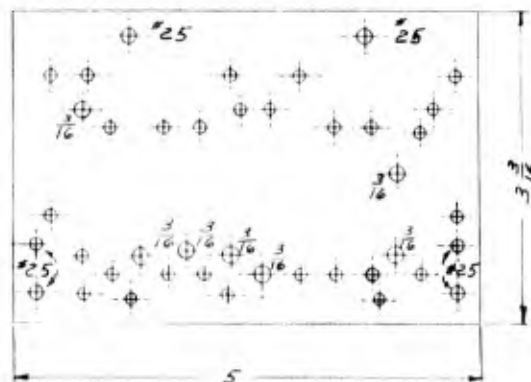
PANEL MTS POST
REF L-37518

REFERENCE ONLY

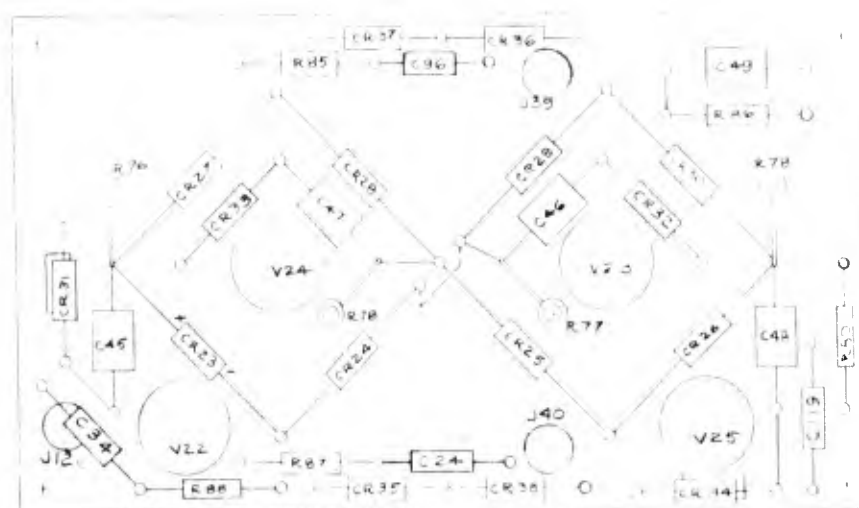
INDICATOR MTS ANGLE
 $\frac{1}{16}$ THK ALUM - 1 REQD



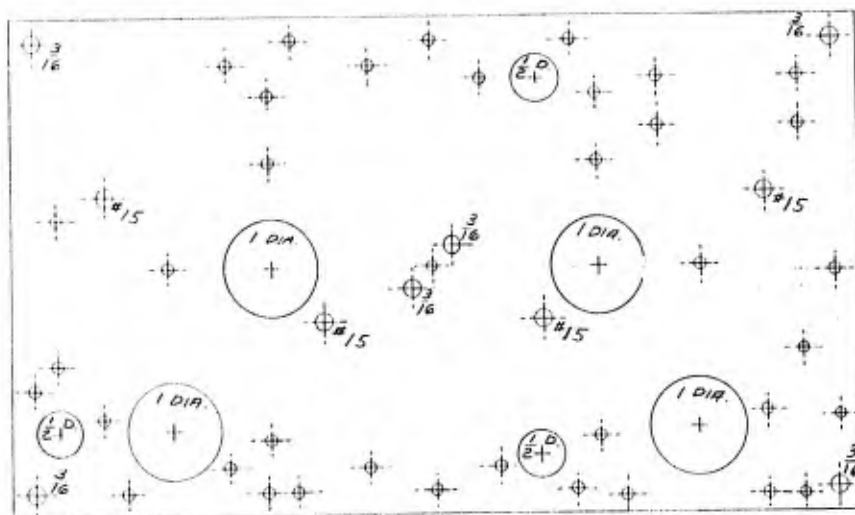
PANEL #2 - $\frac{1}{8}$ THK PHENOLITE OR EQUAL



FORM	ARTIST'S DESCRIPTION	PART NO.	QUANTITY
NATIONAL BUREAU OF STANDARDS NATIONAL INSTITUTE OF TECHNOLOGY DIVISION OF METROLOGICAL ENGINEERING PROJECT NO. 6345 MULTIPLIER ACCUMULATOR REF PANEL DRILLING TEMPLATE ASSY DATE: 10-1-60 BY: NHT CHECKED: D-37512			



NOTE: V & J NUMBERS FOR REFERENCE ONLY

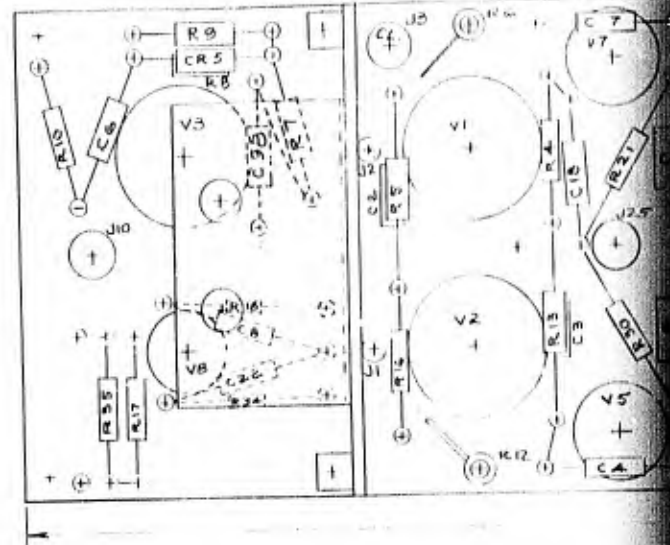
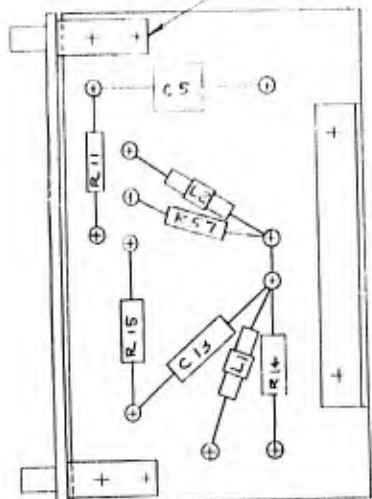


MAT'L - $\frac{1}{8}$ TH'K PHENOLITE OR EQUAL
HOLES NOT NOTED DRILL #33

[illegible]

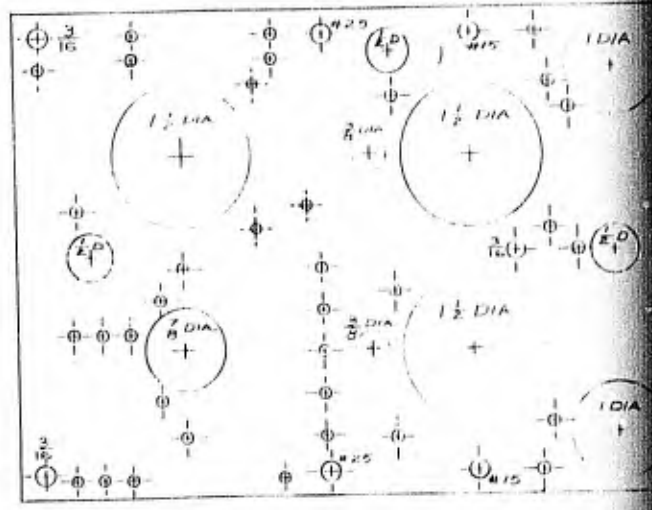
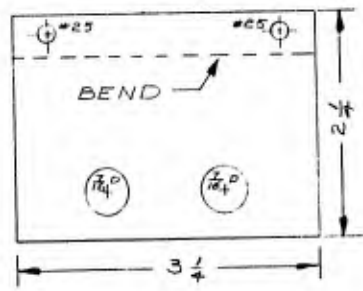
NOTE - "V" & "J" NUMBER

PANEL MTG POST
REF. L-3751B



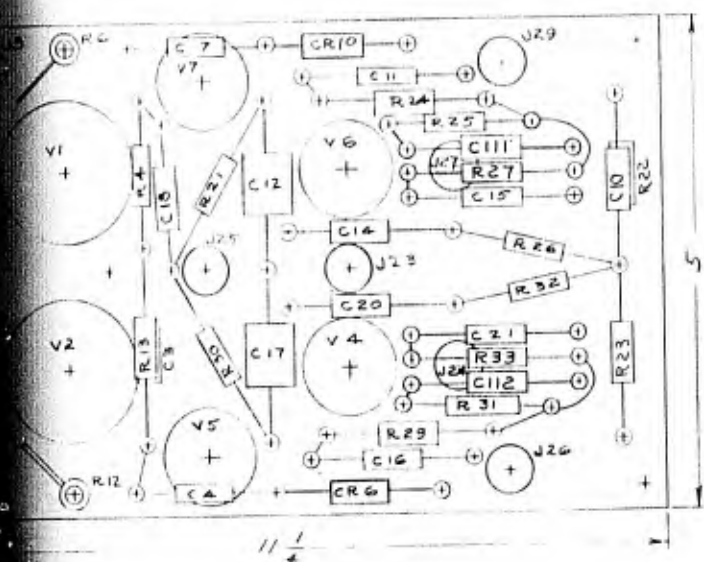
PANEL 1 - 8

INDICATOR MTG. ANGLE
1/16 THK. ALUM. - 1 REQ'D

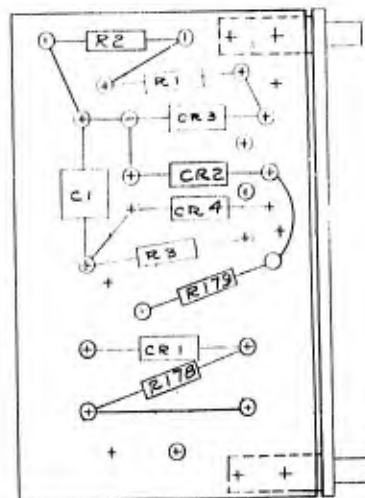


HOLES NOT NOTED DR H-35

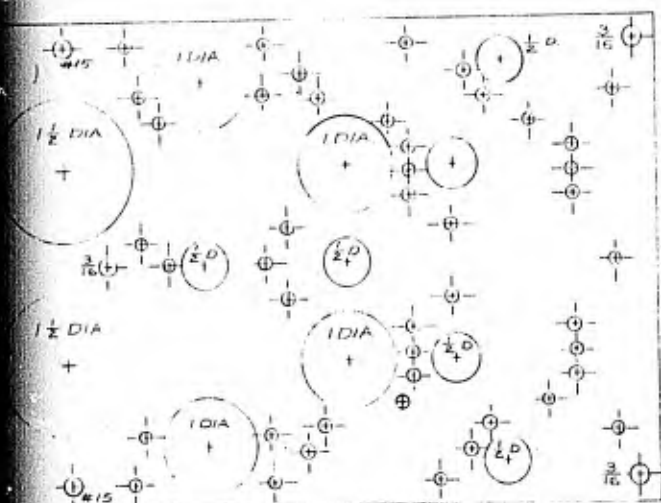
* & "V" NUMBERS ARE FOR REFERENCE ONLY.



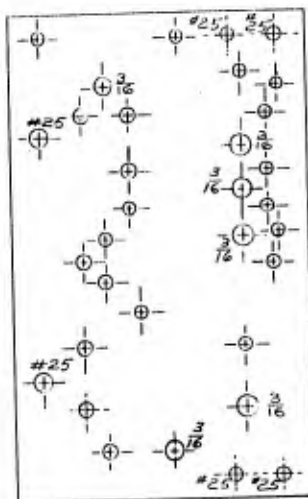
PANEL 1 - 1/8 THK PHENOLITE OR EQUAL



PANEL 2
1/8 THK PHENOLITE OR EQUAL

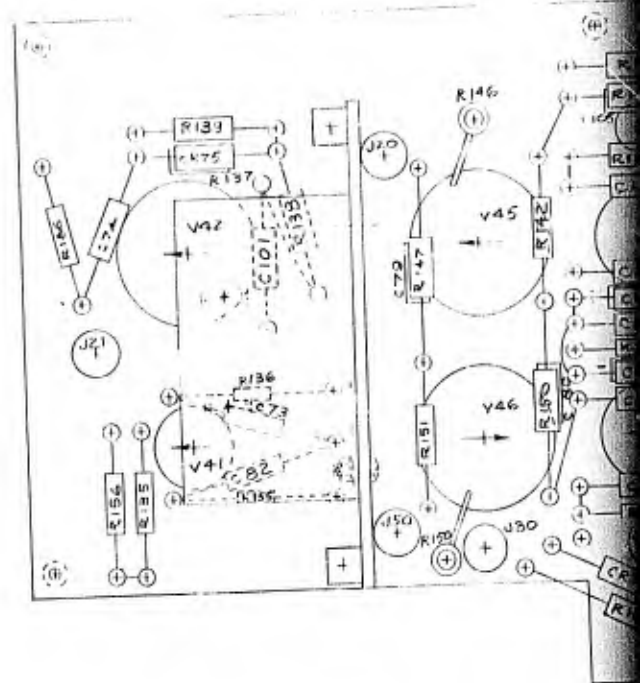
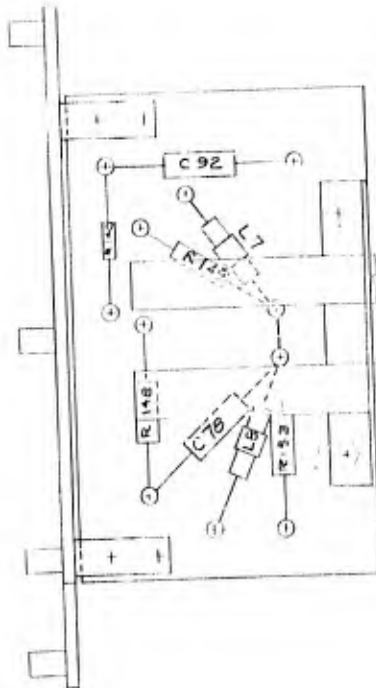


ED DR# 33

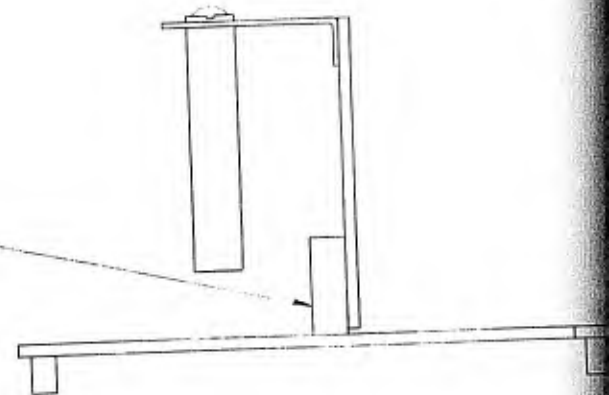


MULTIPLIER "B" REGISTER PANEL DRILLING
TEMPLATE & ASS'Y.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
SERVICES ENGINEERING DEPARTMENT
6325 6-15-67
NHT
D-37514

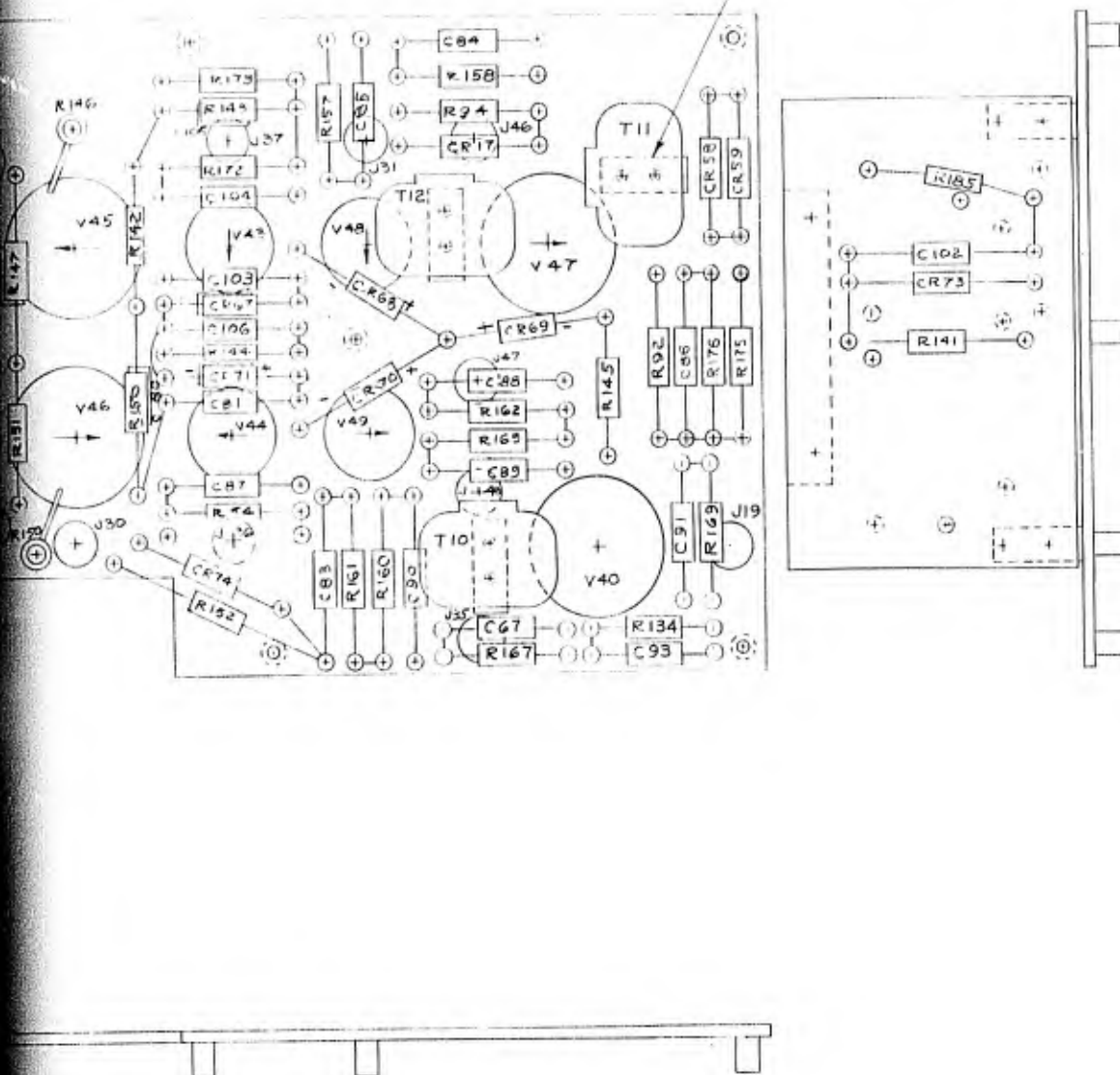


PANEL MTG POST.
REF L-37518



NOTE: V & J NUMBERS FOR REFERENCE ONLY

TRANSFORMER MTC ANGLE - 3 REQ'D
REF. L-37517

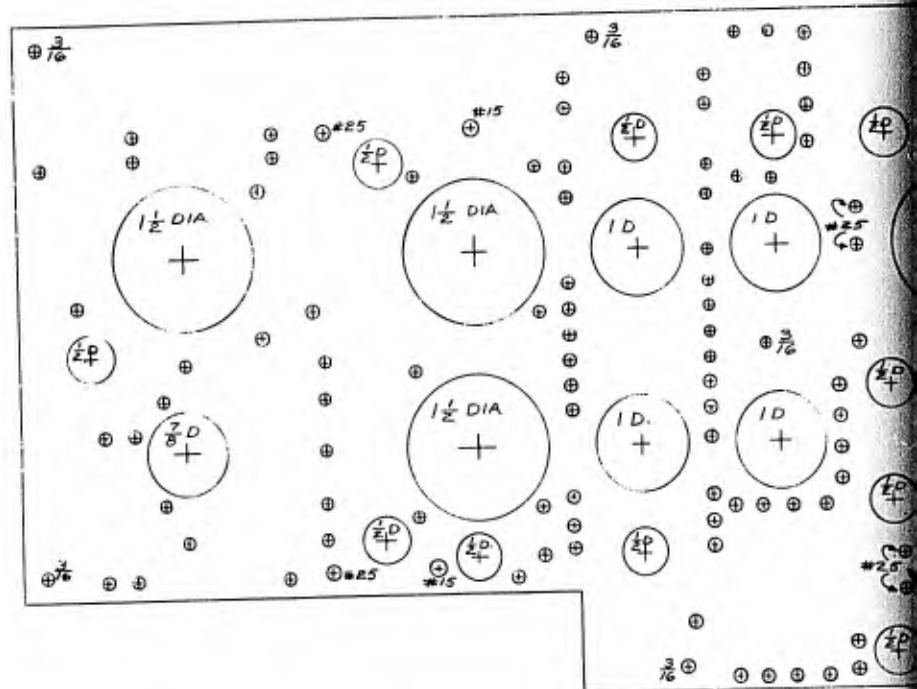


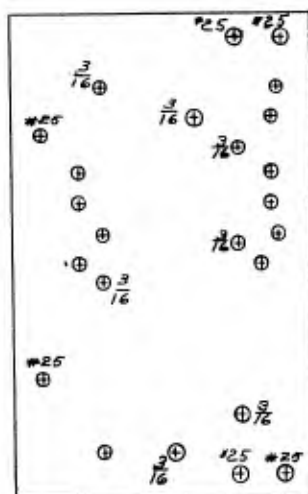
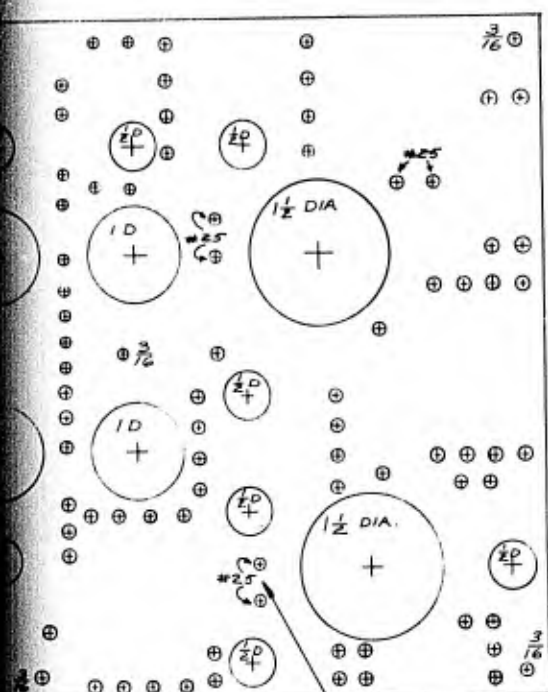
MULTIPLIER 'A' REGISTER COMPONENT ASS'Y.

PANEL TEMPLATE REF. L-37516

6345 6-15-51 MAY.
NHT - D-37515

D-37516

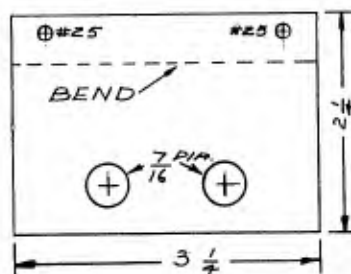




TRANSFORMER MTC ANGLE

NOTED DR. # 33

LITE OR EQUAL

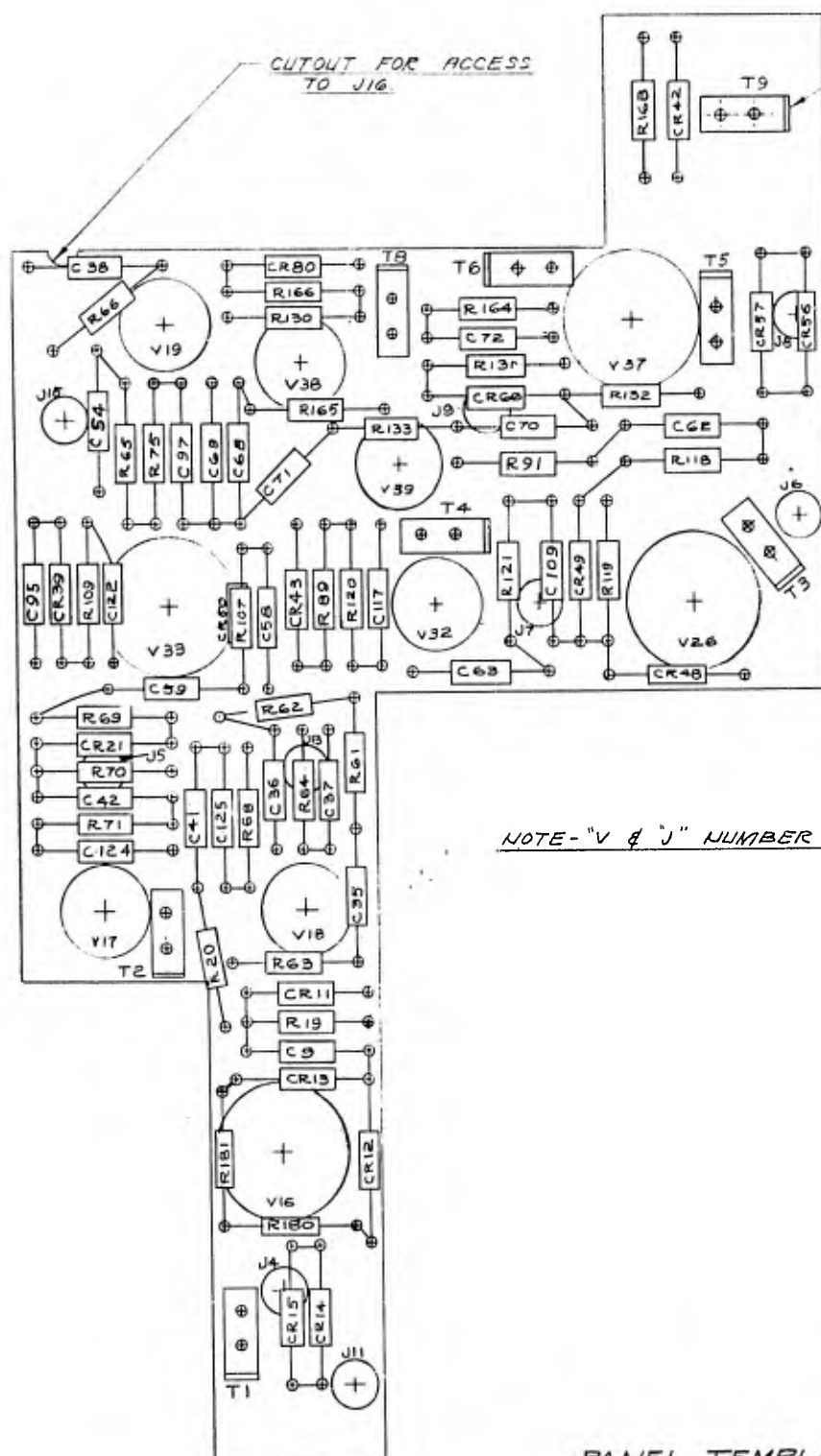


MASTER PANEL TEMPLATE

2

6345
D-37516

D-37517

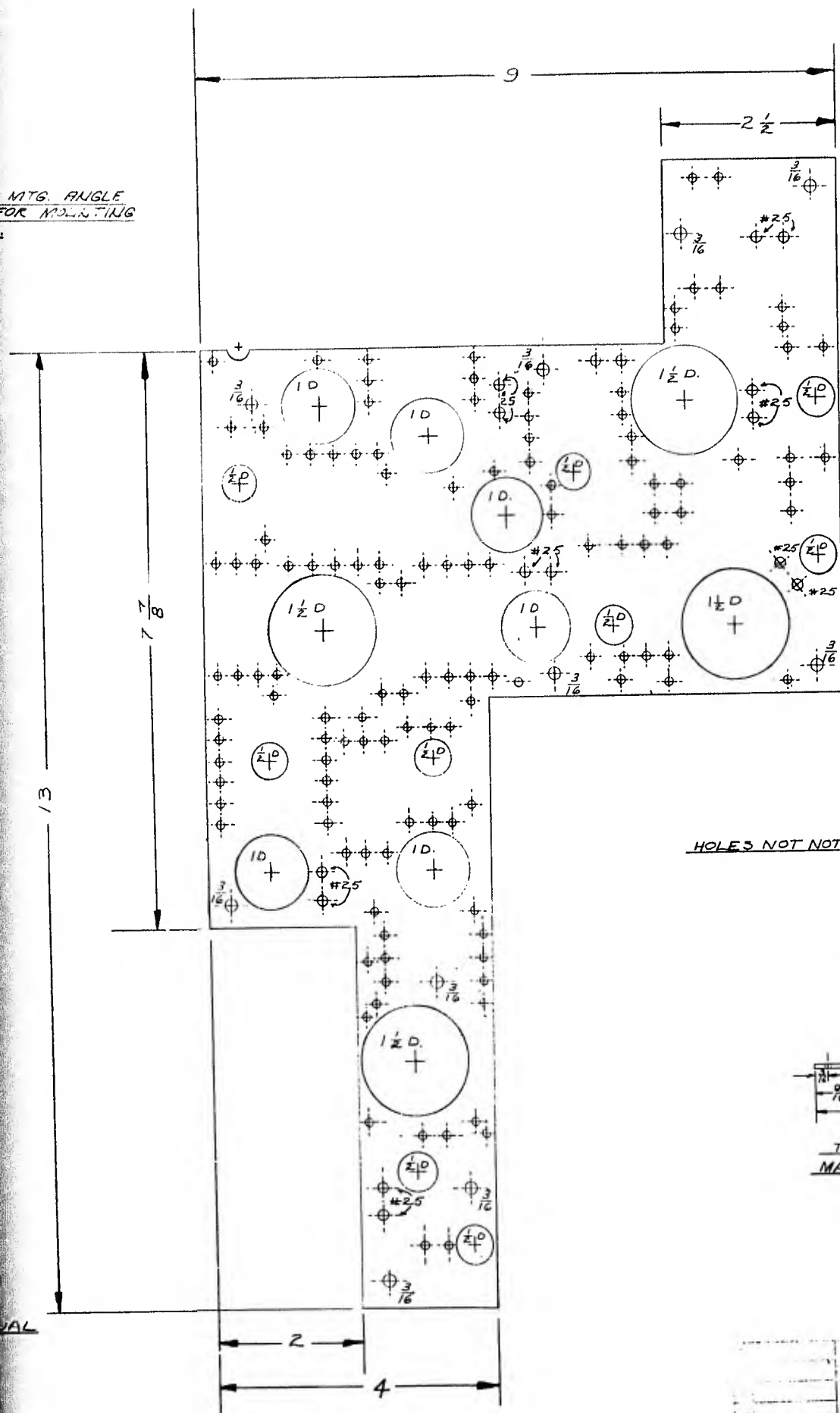


TRANSFORMER MOUNTING ANGLE
SEE D-37515 FOR MOUNTING
TRANSFORMER.

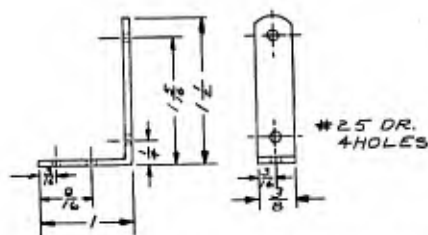
NOTE - "V & J" NUMBER FOR REF. ONLY.

PANEL TEMPLATE
MAT'L - $\frac{1}{8}$ PHENOLITE OR EQUAL

MTG. ANGLE
FOR MOUNTING
ER.

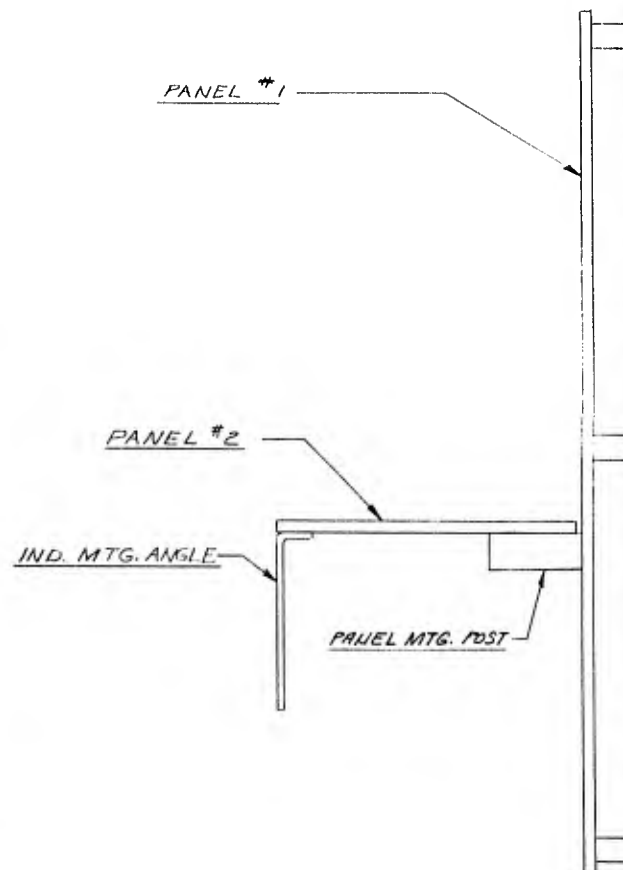
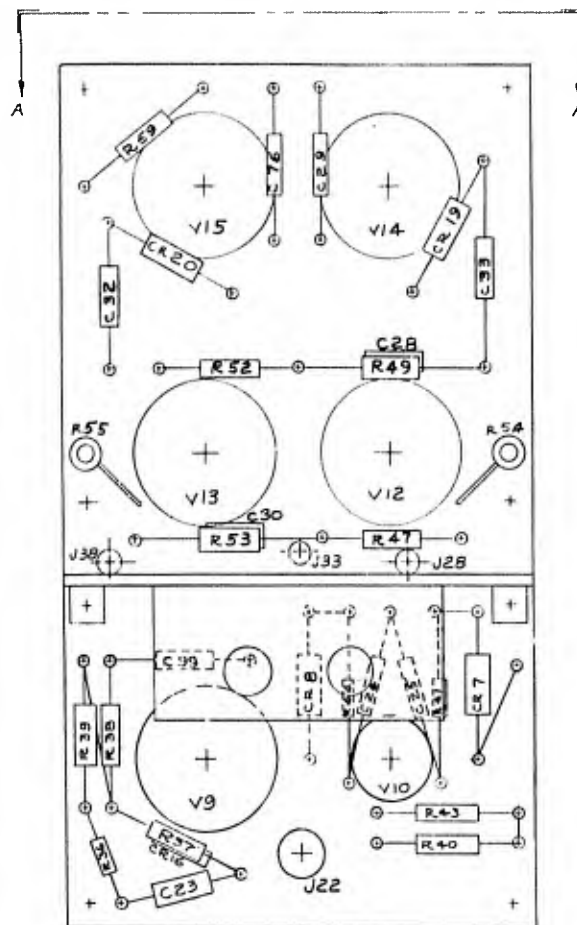


HOLES NOT NOTED DR.#33

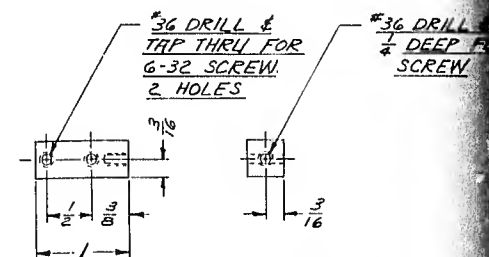
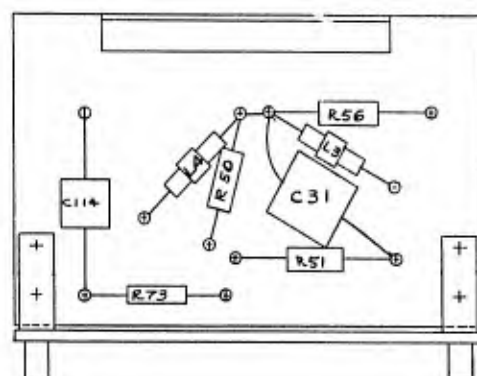


TRANSFORMER MTG ANGLE - 7 REQ'D.
MAT'L - 1/8 STAIN. ST'L. OR EQUAL

GATE AND BUFFER PANEL NO. 1	
DRILLING TEMPLATE & ASSY.	
FULL	7-3-47
D-37517	



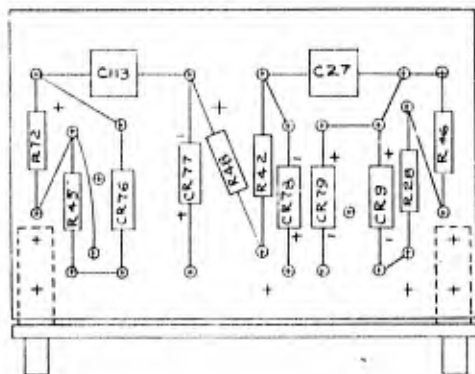
NOTE - "J" & "V" NUMBERS ARE FOR REFERENCE ONLY.



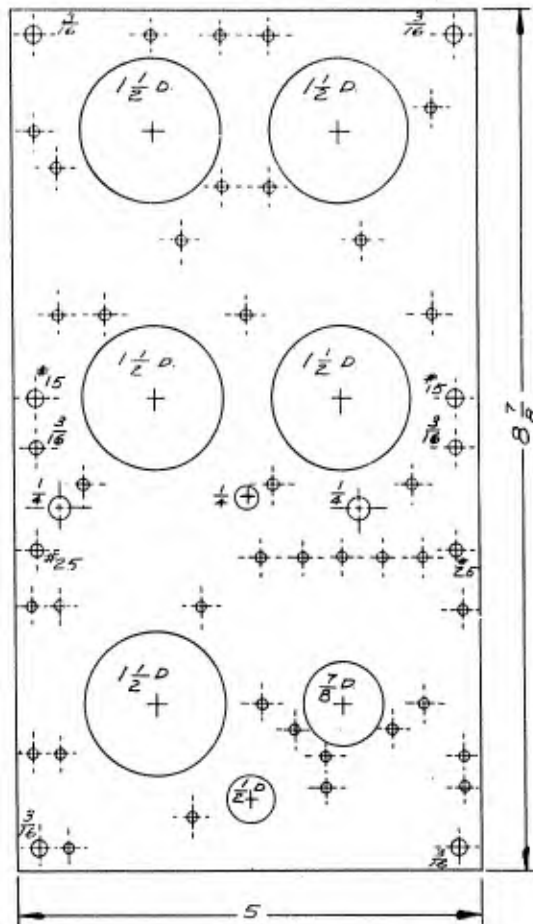
PANEL MTG. POST - 2 REQ'D.
MAT'L - 3/8" SQ. BRASS STOCK

DRILLING TEMPLATES HOLES NOT NOTED DRILL #33

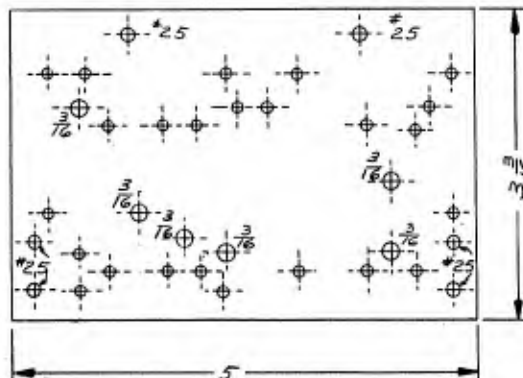
PANEL #1 - $\frac{1}{8}$ " TH'K. PHENOLITE OR EQUAL



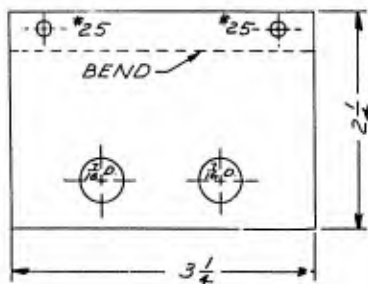
VIEW (UPRIGHT) A-A SHOWING
 COMPONENT ASS'Y PLAN



PANEL #2 - $\frac{1}{8}$ " TH'K. PHENOLITE OR EQUAL



INDICATOR MTG. ANGLE
 $\frac{1}{16}$ " TH'K ALUM. - 1 REQ'D



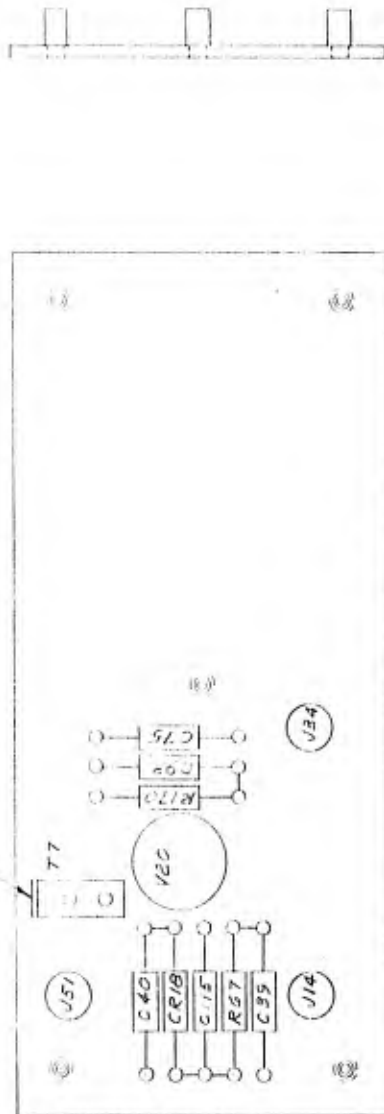
#36 DRILL & TAP
 1/4" DEEP FOR 6-32
 SCREW

RE'D.
 STOCK

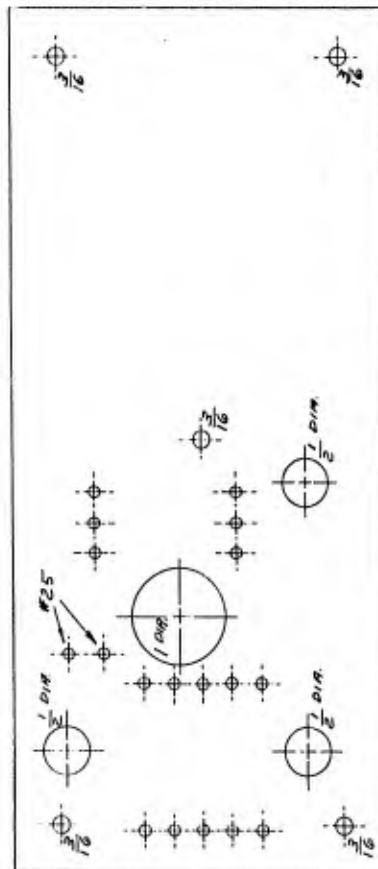
MATERIAL DESCRIPTION		PART NO.	QTY.
MATERIALS SECTION OF THE DIVISION OF ELECTRICAL ENGINEERING PROJECT NO. 6345			
MULTIPLIER CARRY F.F. PANEL DRILLING TEMPLATE & ASS'Y			
SCALE: FULL	IN. NO. Holes	DATE	
W. ENG.	CL		
WAB	APP.	DATE	
		D-37518-1	

C-37521

TOP OF BOARD 175 HOLE REF D-37521
SEE D-37521 FOR MOUNTING TRANSFORMER



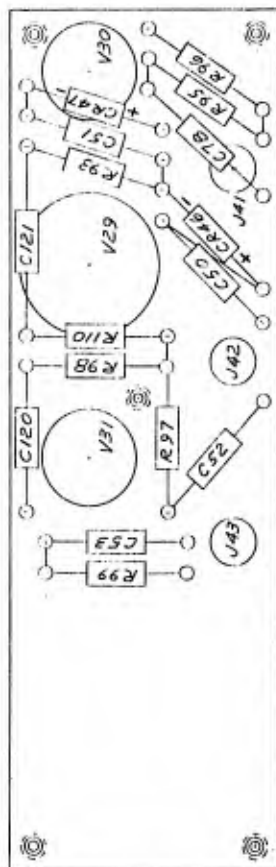
NOTE - V & J NUMBERS FOR REF. ONLY



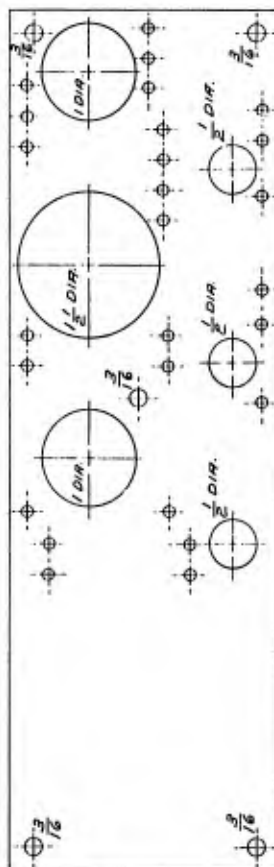
NOTE - MAT'L: 1/8" THK LINEN BASE PHENOLITE
HOLES NOT NOTED DRILL #53

GATE & BUFFER AMPLIFIER PANEL #2
DRILLING TEMPLATE & ASSY.

HARRIS-SCOTT COMPANY OF NEWARK, N.J.	
DATE	10/10/57
BY	W. J. C. 37521



NOTE - "V" & "J" NUMBERS FOR REF. ONLY.



NOTES - MAT'L: 1 THK LINEN BASE PHENOLITE.
HOLES NOT NOTED DRILL #33

GATE & BUFFER AMPLIFIER PANEL #3
DRILLING TEMPLATE & ASS'Y

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
SEE-MECHANICALS LABORATORY

6547
 7-20-54
 A-30681-1

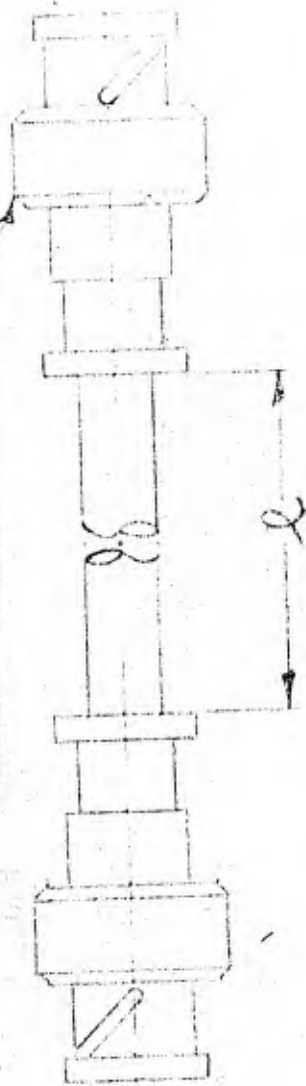
MULTIPLIER COLOR CODE

+250 V. —————	WHITE	WITH	RED	TRACER	#20
1150 V. —————	"	"	YELLOW	"	"
GROUND —————	"	"	BLACK	"	"
-50 V. —————	"	"	BLUE	"	"
GRID LEADS —————	"	"	GREEN	"	"
MISC. JUMPERS —	"	"	NO	"	"
FILAMENTS — — —	"	"	BROWN	"	#16 & #20
-20 V. —————	"	"	VIOLET	"	#20
-10 V. —————	"	"	GRAY	"	"

A-30681-1

SA-39321

CONNECTOR: US 260-U



CABLE RG-62U

No.	CABLE DESIGNATION	LABEL		LENGTH "C"	NO REQ
		END #1	END #2		
A	CARRY DIGIT	PL19	PL20	35"	4
B	HI-SPEED CARRY	PL6	PL7	28"	4
C	MULTIPLY	BR5, PL23	MULTIPLY	38"	1
D	TO RT BR4-5	BR4, PL27	BR5, PL1		1
E	TO RT BR4-5	BR4, PL24	BR5, PL12		1
F	AC5 TO BRO	AC5, PL30	BRO, PL12		1
G	AC5 TO BRO	AC5, PL40	BRO, PL1		1
H					
I					

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

SINGLE VIDEO CABLES

SCALE: — DR. JAC. B. 35-47

ENG.

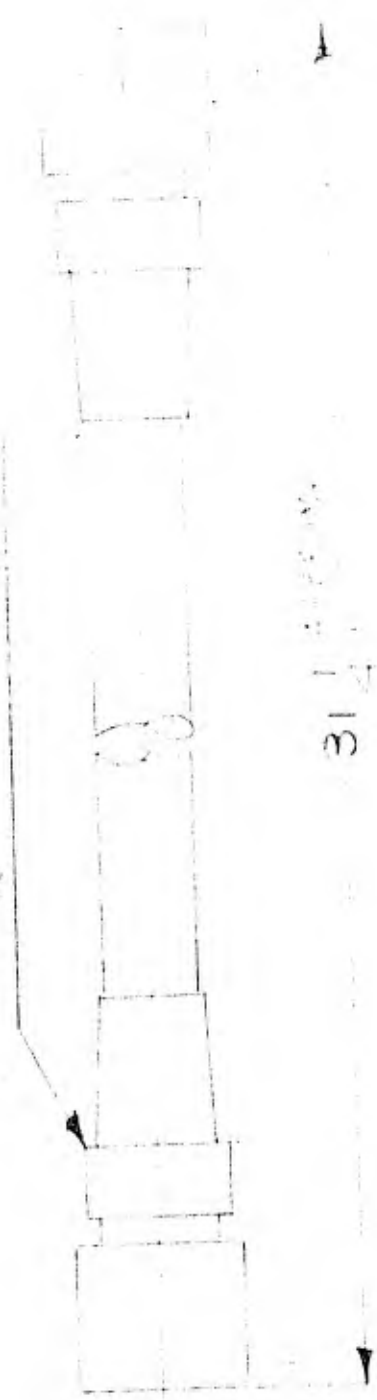
CK.

APP.

SA-39321

SA-39322

CONNECTOR - (1-39322-6)
2 REQUIRED



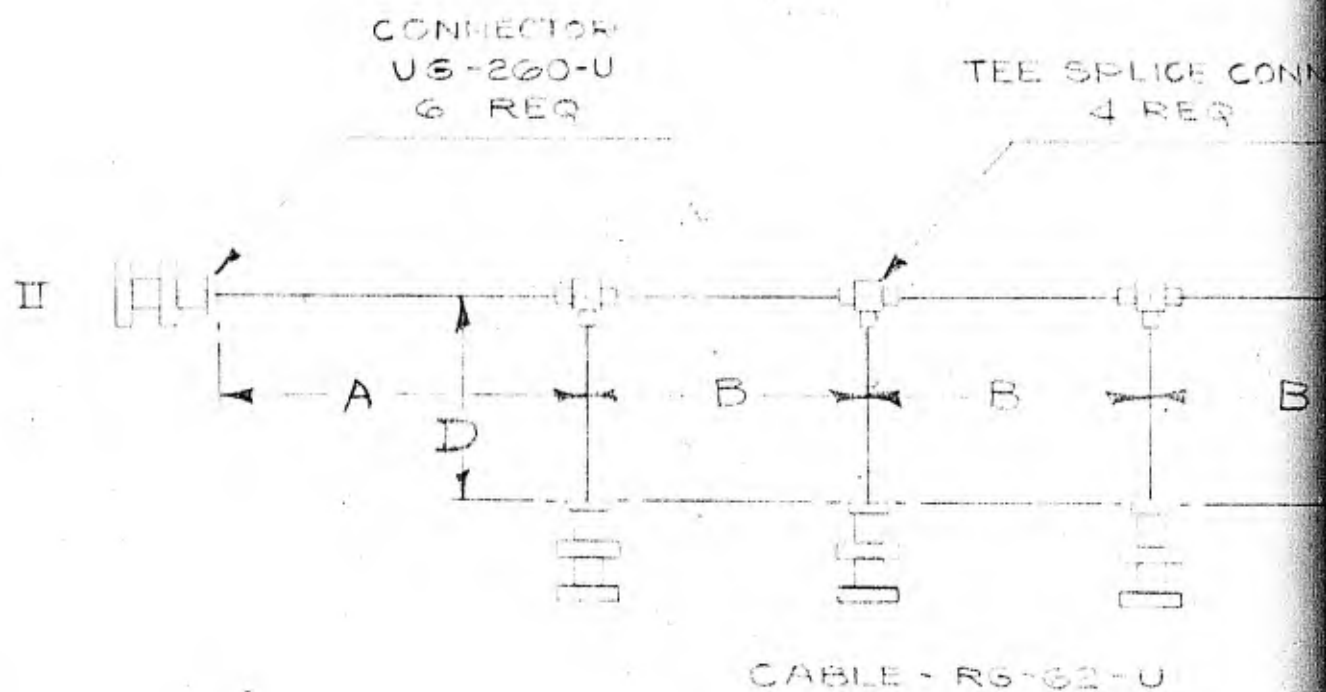
31 1/2

CABLE - RG-650
CABLE LENGTH -
CUT TO 80" BEFORE REMOVAL
NO. REQUIRED - 24

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6315

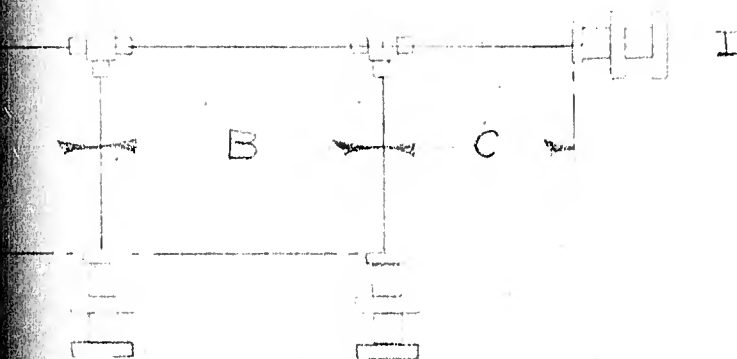
DELAY CABLE

SCALE: —		DR. <i>W. E. Smith</i>		SA-39322
ENG <i>W. E. Smith</i>	CK.	APP.		



NO.	NAME	LABEL			
		END I	END II	EACH BRANCH	
"X"	CARRY ORDER BUS	CARRY	PL14	PL14	30
"Y"	ADD ORDER BUS	ADD	PL86	PL86	30

SPLICE CONNECTOR
4 REQ



22-U

EL		LENGTH				NO. REQ
II	EACH BRANCH	A	B	C	D	
4	PL14	30	20	16	11	1
6	PL36	30	20	16	11	1

FOR 5-DIGIT MULTIPLIER ONLY

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

ADD AND CARRY ORDER BUSES

SCALE: _____

DR. HHS 8-26-47

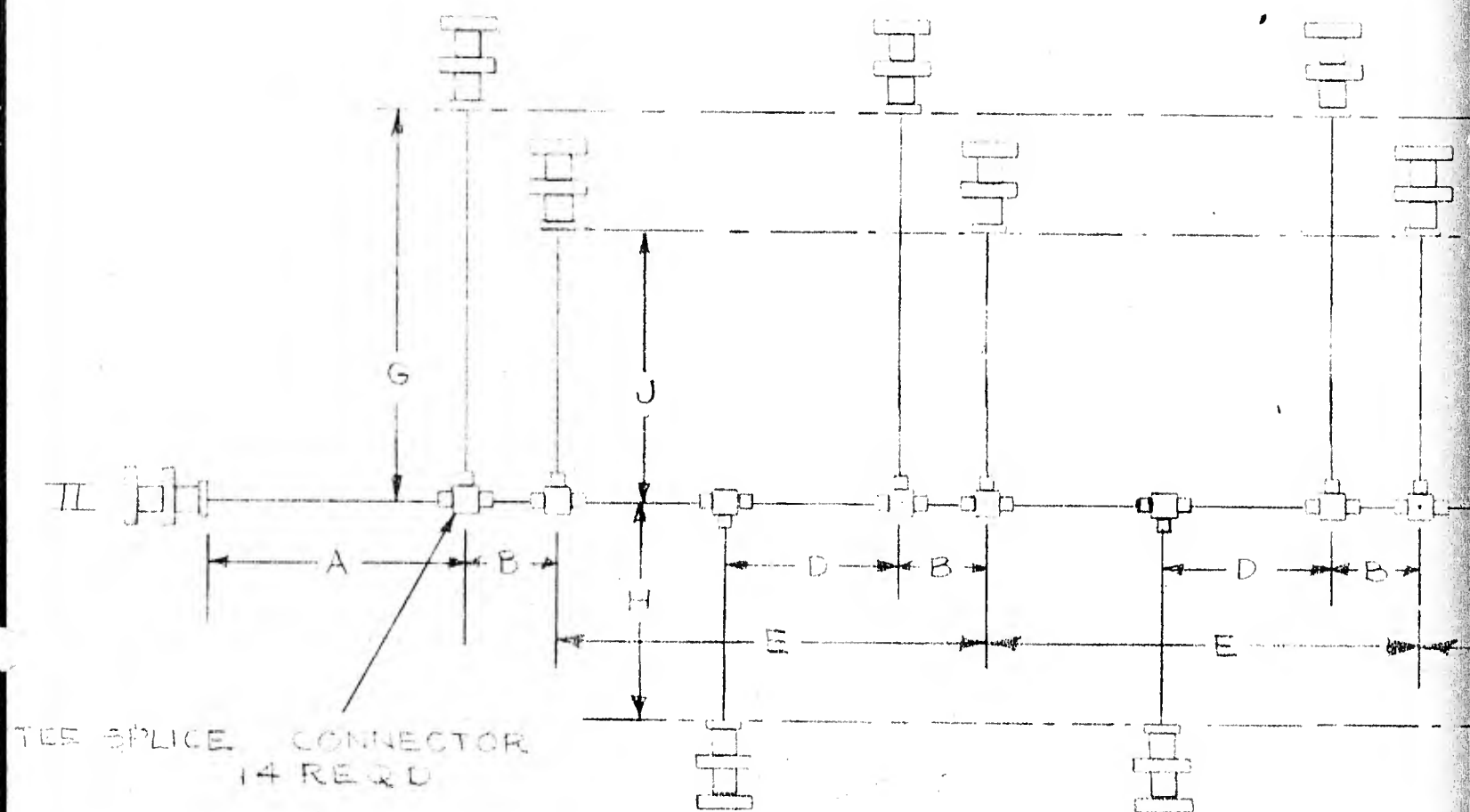
ENG.

CK.

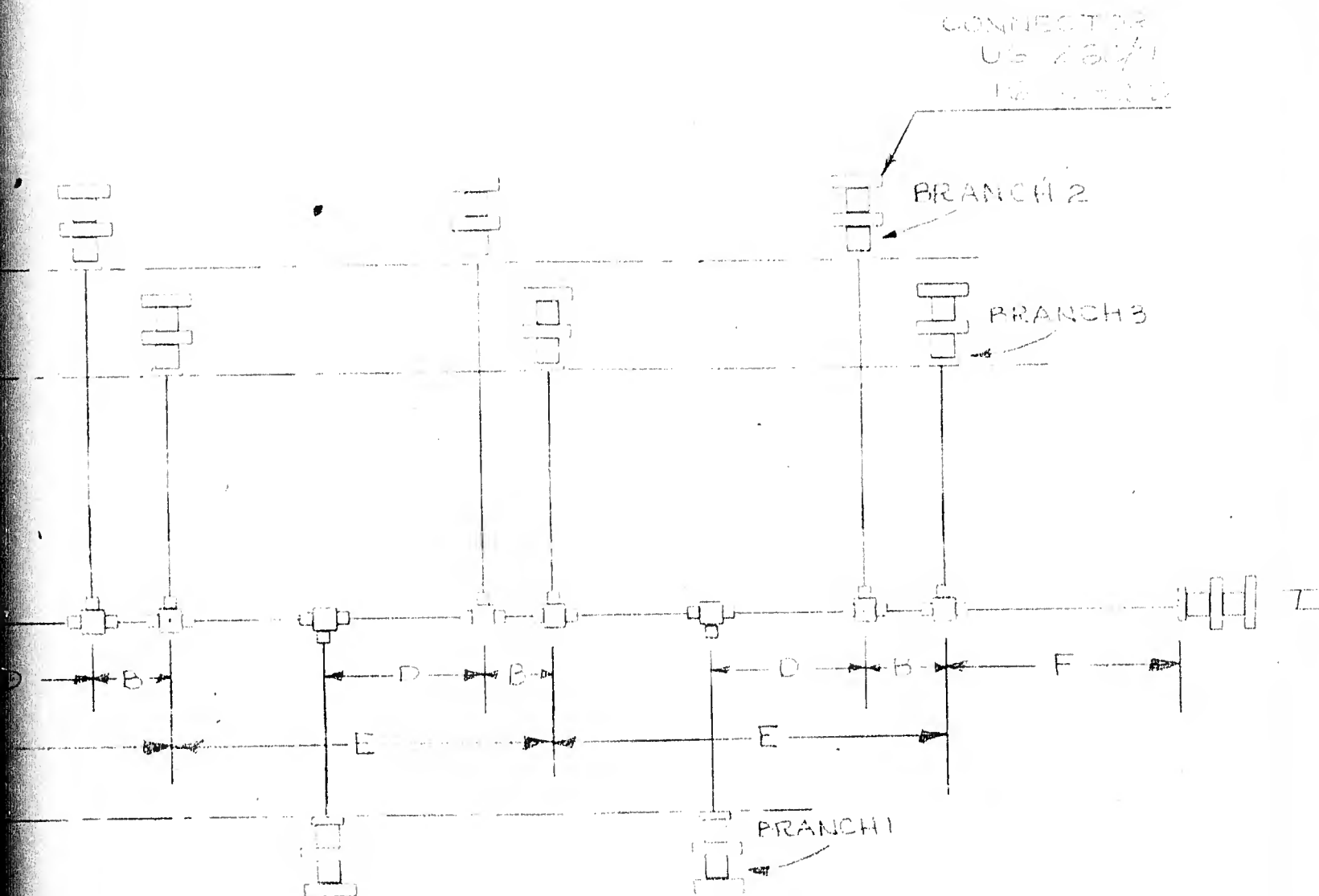
APP.

C.W.V. 8/27/47

SB-39323



NAME	LABEL					A	B
	END 1	END 2	BRANCH-1	BRANCH-2	BRANCH-3		
CLEAR ORDER BUS	CLEAR	PL-3	PL-3	PL-20	PL-17	15	2 $\frac{5}{8}$



RG-62/U

NOTE: ALL BRANCHES OF EQUAL LENGTH
HAVE SAME BRANCH NO.

LENGTH									NO. REQ'D
A	B	C	D	E	F	G	H	J	
15	$2 \frac{5}{8}$	$23 \frac{1}{2}$	$10 \frac{1}{2}$	20	21	15	$6 \frac{1}{4}$	5	1

FOR 5-DIGIT MULTIPLIER ONLY

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

CLEAR ORDER BUS

SCALE:

DR. M. L. G. 8-27-47

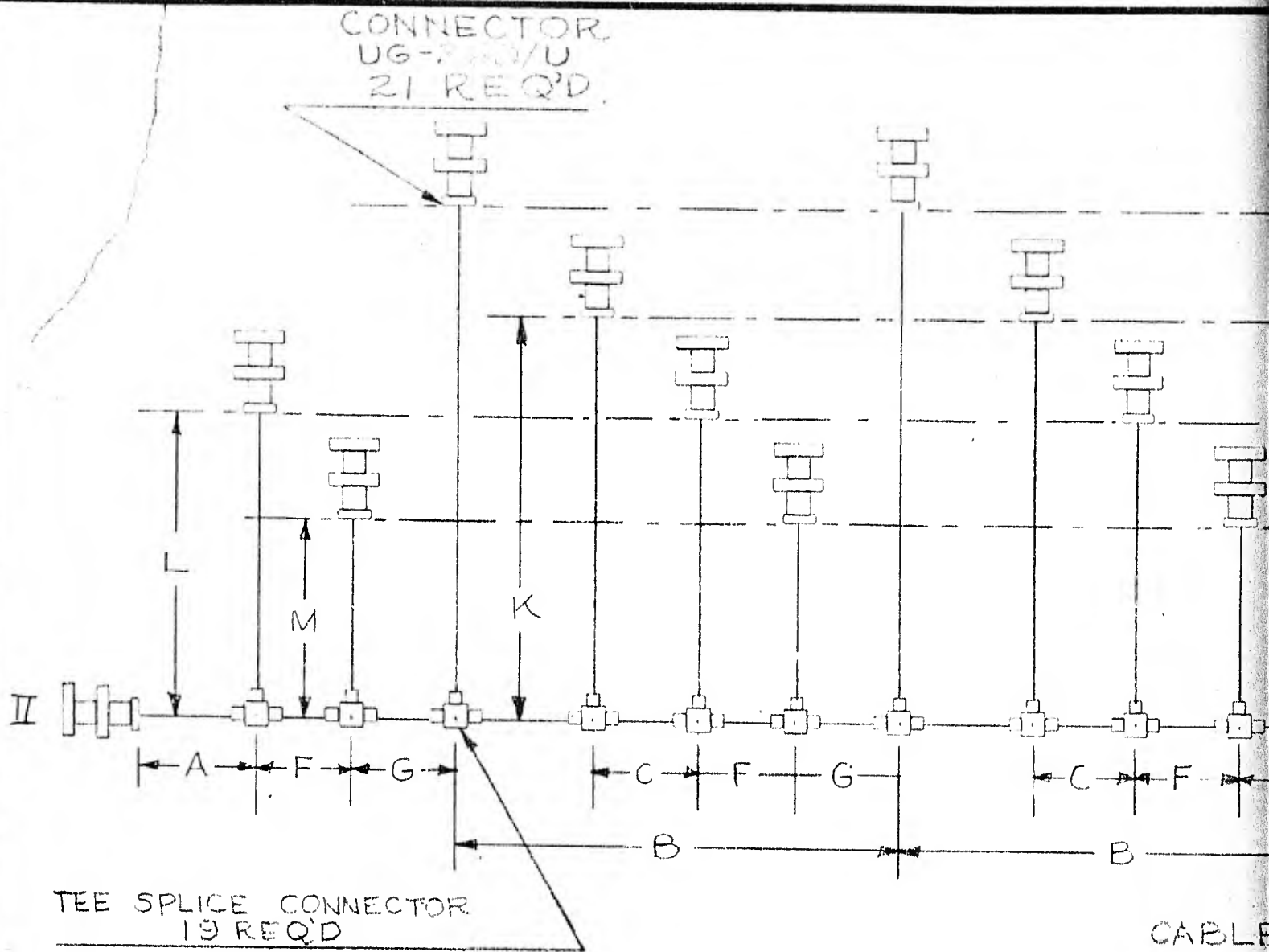
ENG.
C.W.W. 8/28/47

CK.

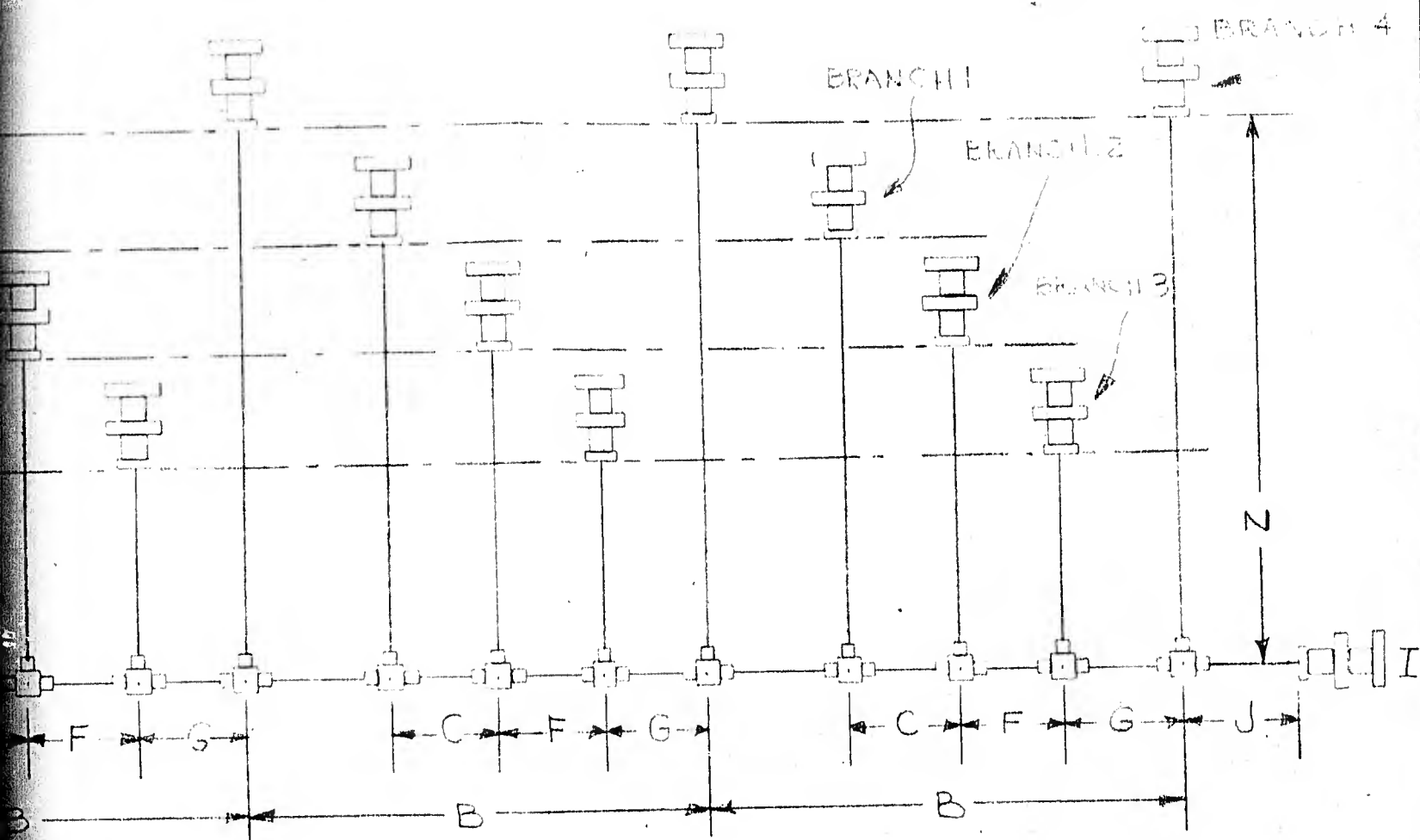
APP.

SB-39324

SB-39325



NAME	LABEL						A	B
	END I	END II	BRANCH-1	BRANCH-2	BRANCH-3	BRANCH-4		
RESTORE ORDER BUS	RESTORE	PL-10	PL-10	PL-30	PL-21	PL-22	21 $\frac{1}{2}$	20



CABLE RG-62/U

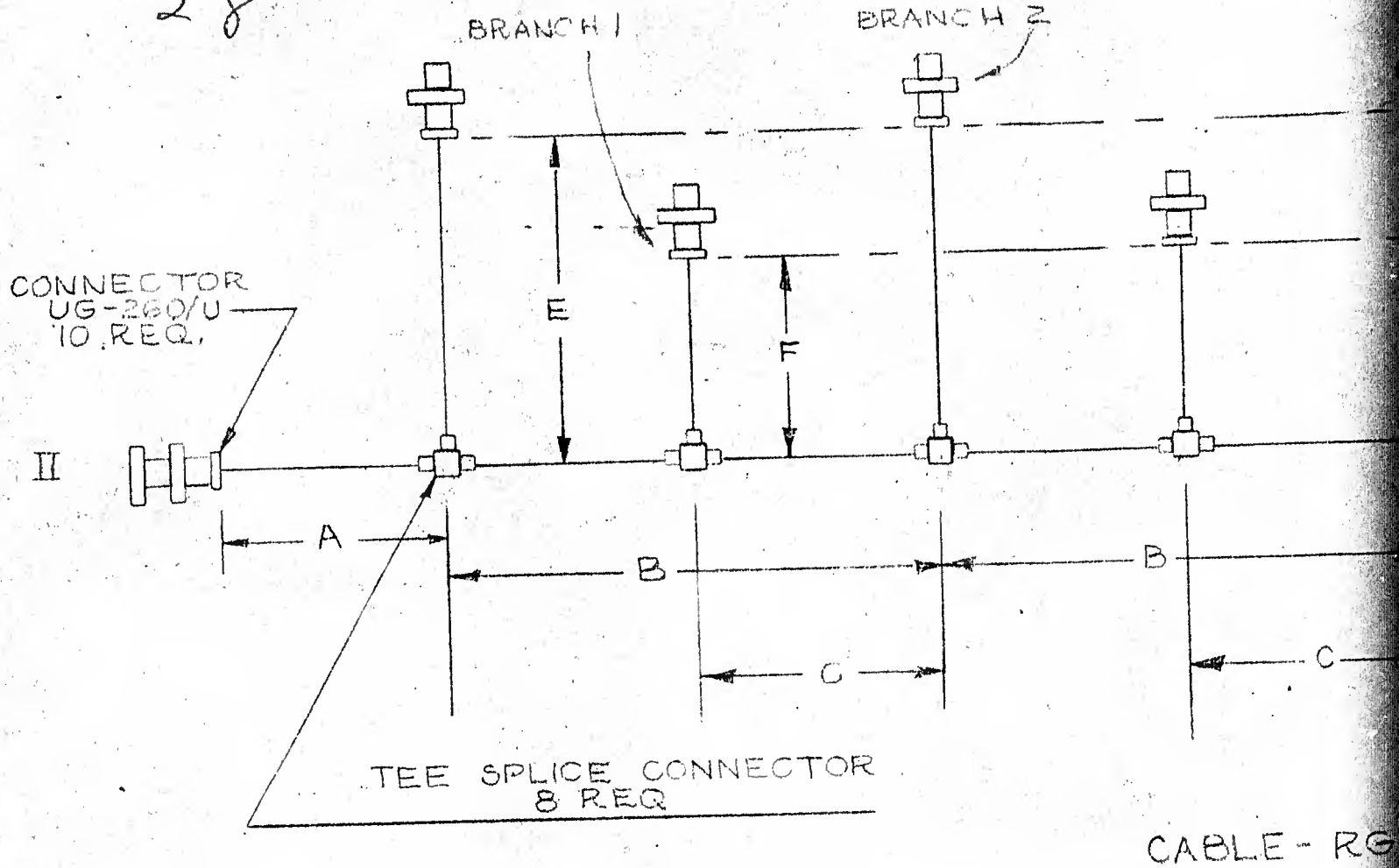
NOTE: BRANCHES OF EQUAL LENGTH II
HAVE SAME BRANCH NO.

LENGTH										NO. REQ'D
B	C	F	G	J	K	L	M	N		
20	8	4 $\frac{1}{4}$	2 $\frac{1}{4}$	15	16	5	7	37	1	

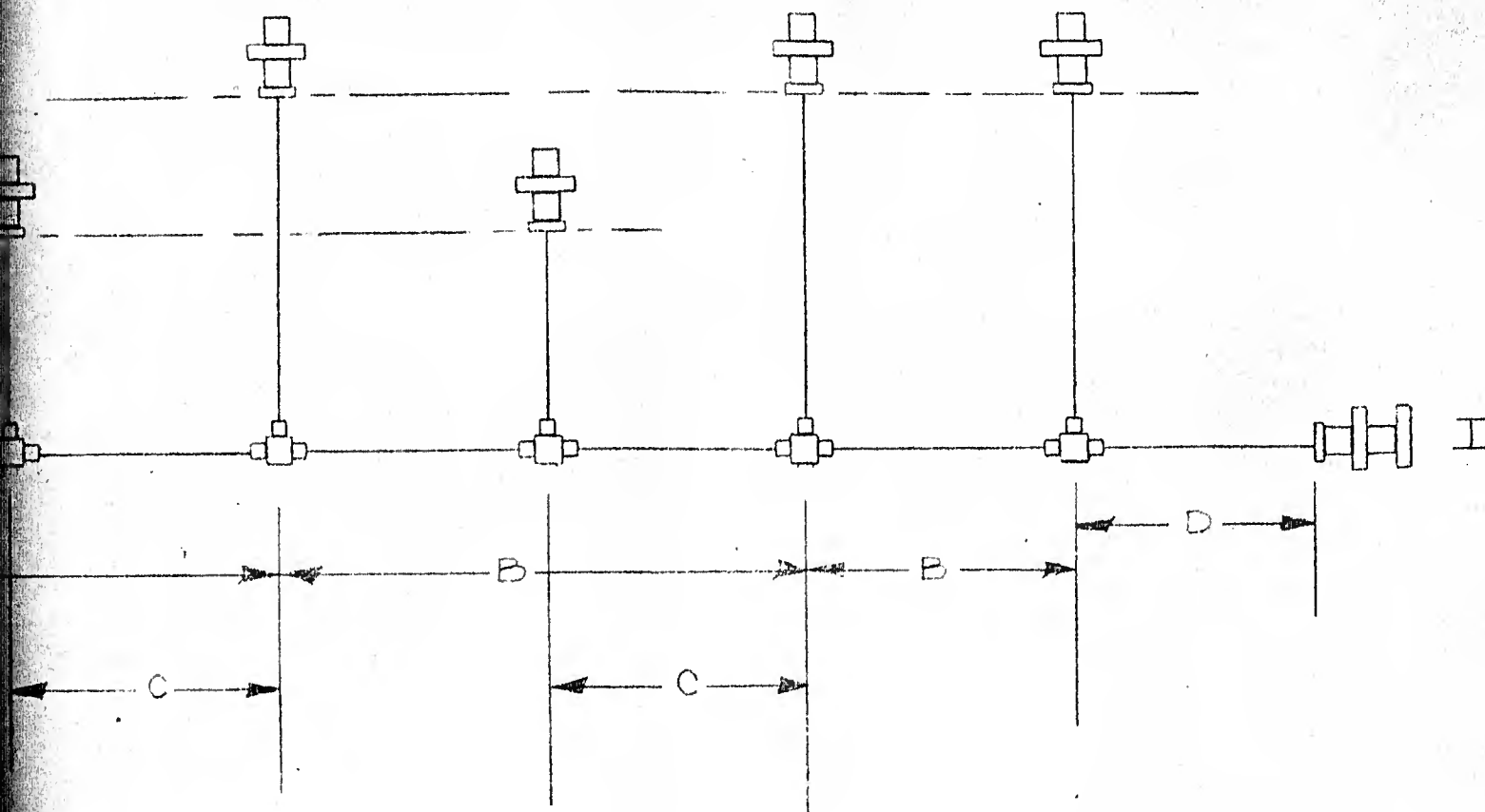
FOR 5-DIGIT MULTIPLIER ONLY

SERVOMECHANISMS LABORATORY OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345			
RESTORE-ORDER BUS			
SCALE:	DR. McHugh - 8-2747		SB-39325
ENG. C.W.W. 8/28/47	CK.	APP.	

28



NAME	LABEL			
	END I	END II	BRANCH I	BRANCH II
SHIFT & CARRY ORDER BUS	SHIFT & CARRY	PL-23	PL-23	P



BLE-RG-62/U

NOTE: BRANCHES OF EQUAL LENGTH
HAVE SAME BRANCH NO.

DEL.			LENGTH						NO. REQ.
II	BRANCH	BRANCH	A	B	C	D	E	F	
3	PL-23	PL-49	22	20	$14\frac{1}{4}$	$13\frac{1}{2}$	5	9	1

FOR 5-DIGIT MULTIPLIER ONLY

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

SHIFT AND CARRY ORDER BUS

SCALE: _____

DR. V.M. 8-27-47

ENG.

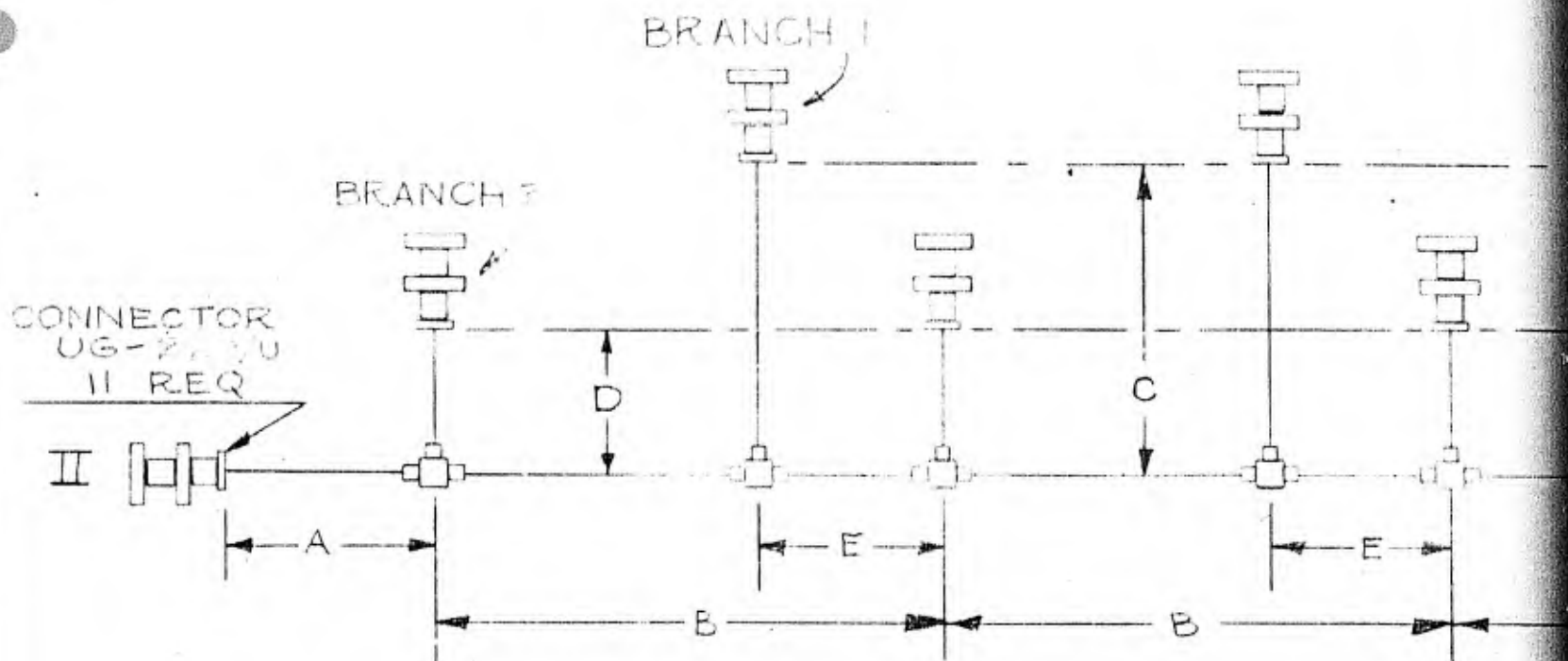
C.W.W. 8/28/47

CK.

APP.

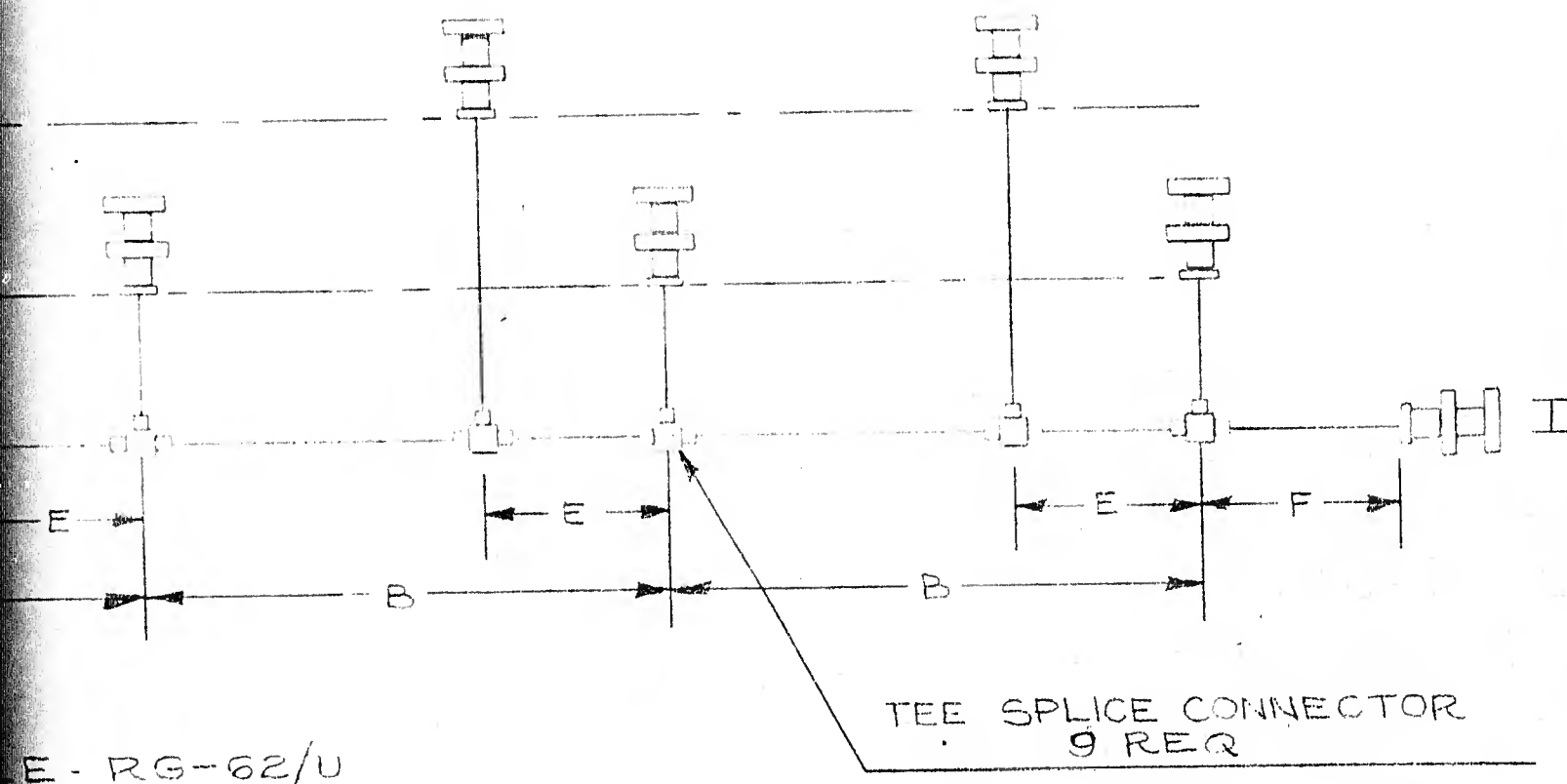
SB-39326

2



CABLE - RG-6

NAME	LABEL				A	B
	END I	END II	BRANCH-1	BRANCH-2		
READ IN BUS	READ IN	PL-13	PL-13	PL-47	16	20



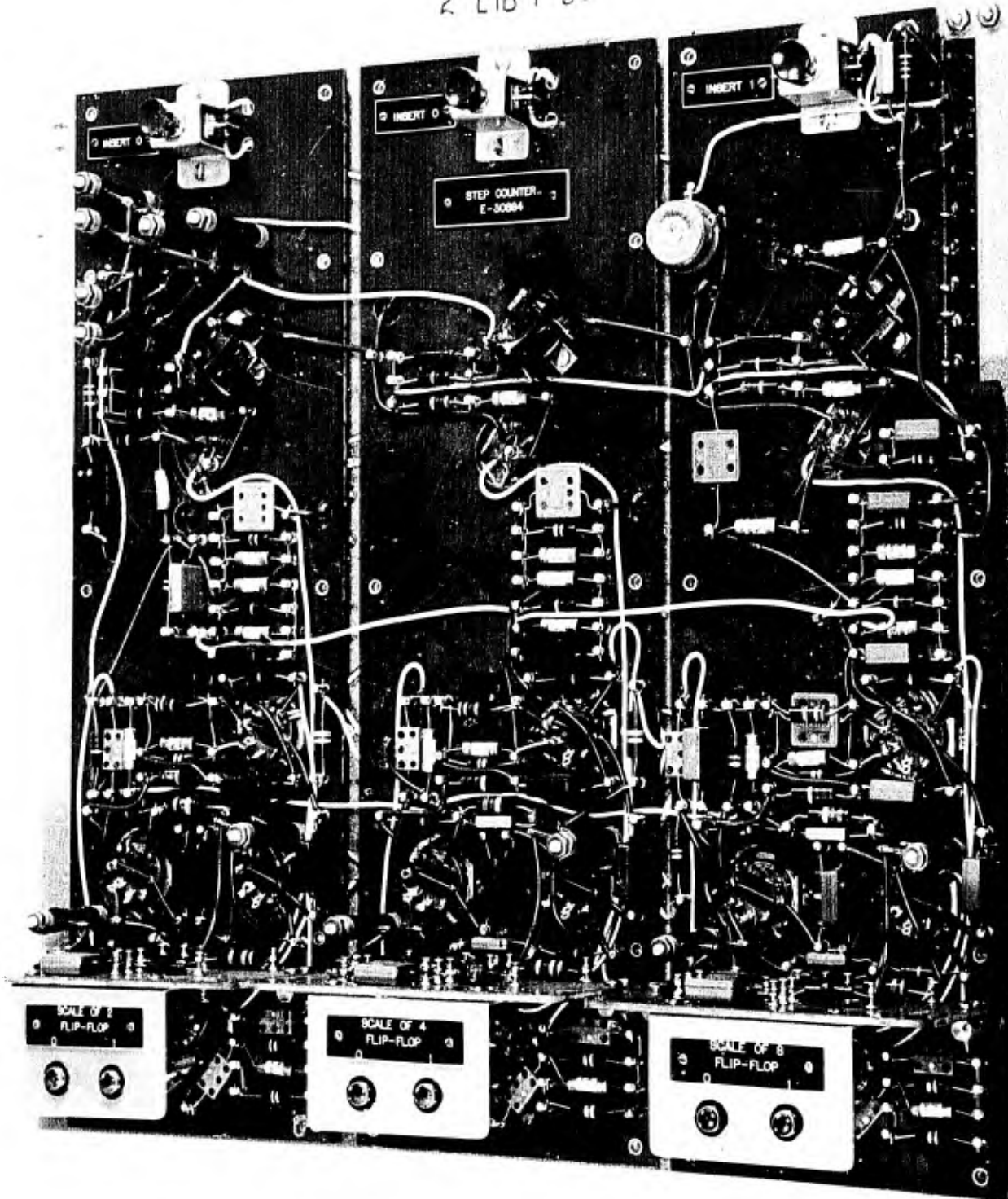
NOTE: BRANCHES OF EQUAL
LENGTH HAVE SAME
BRANCH NO.

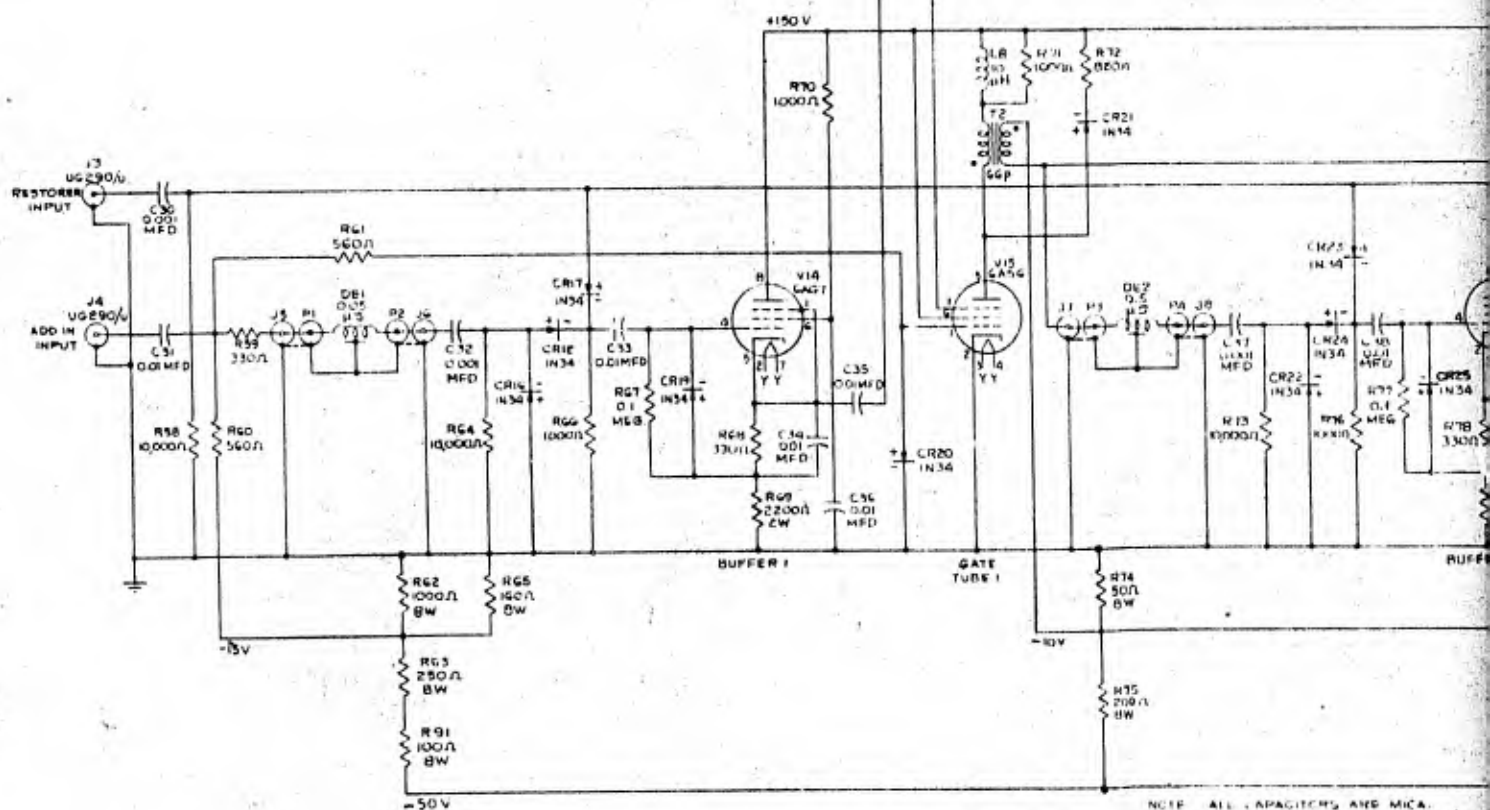
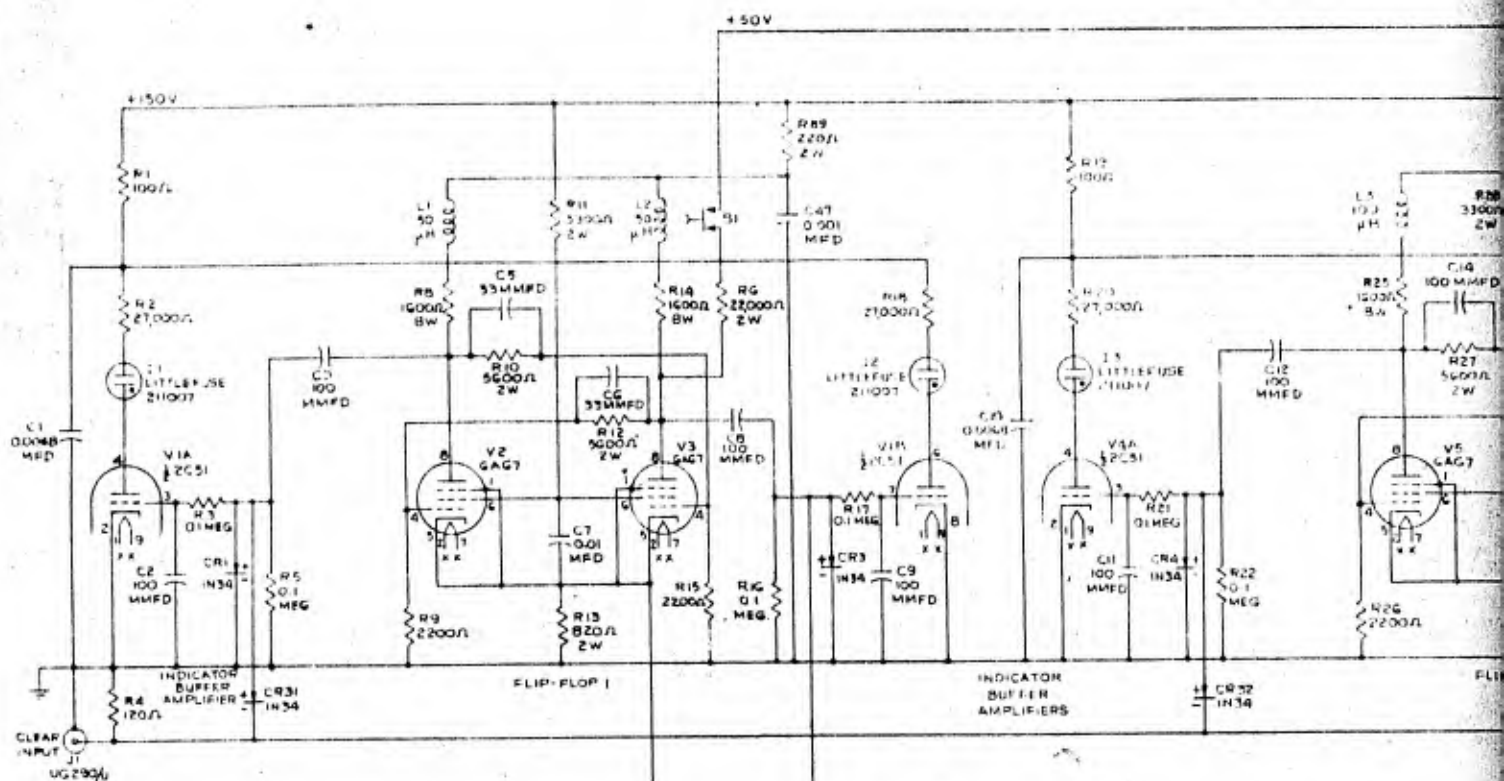
LENGTH							NO REQ
2	A	B	C	D	E	F	
7	16	20	14	5	27	27	1

FOR 5-DIGIT MULTIPLIER ONLY

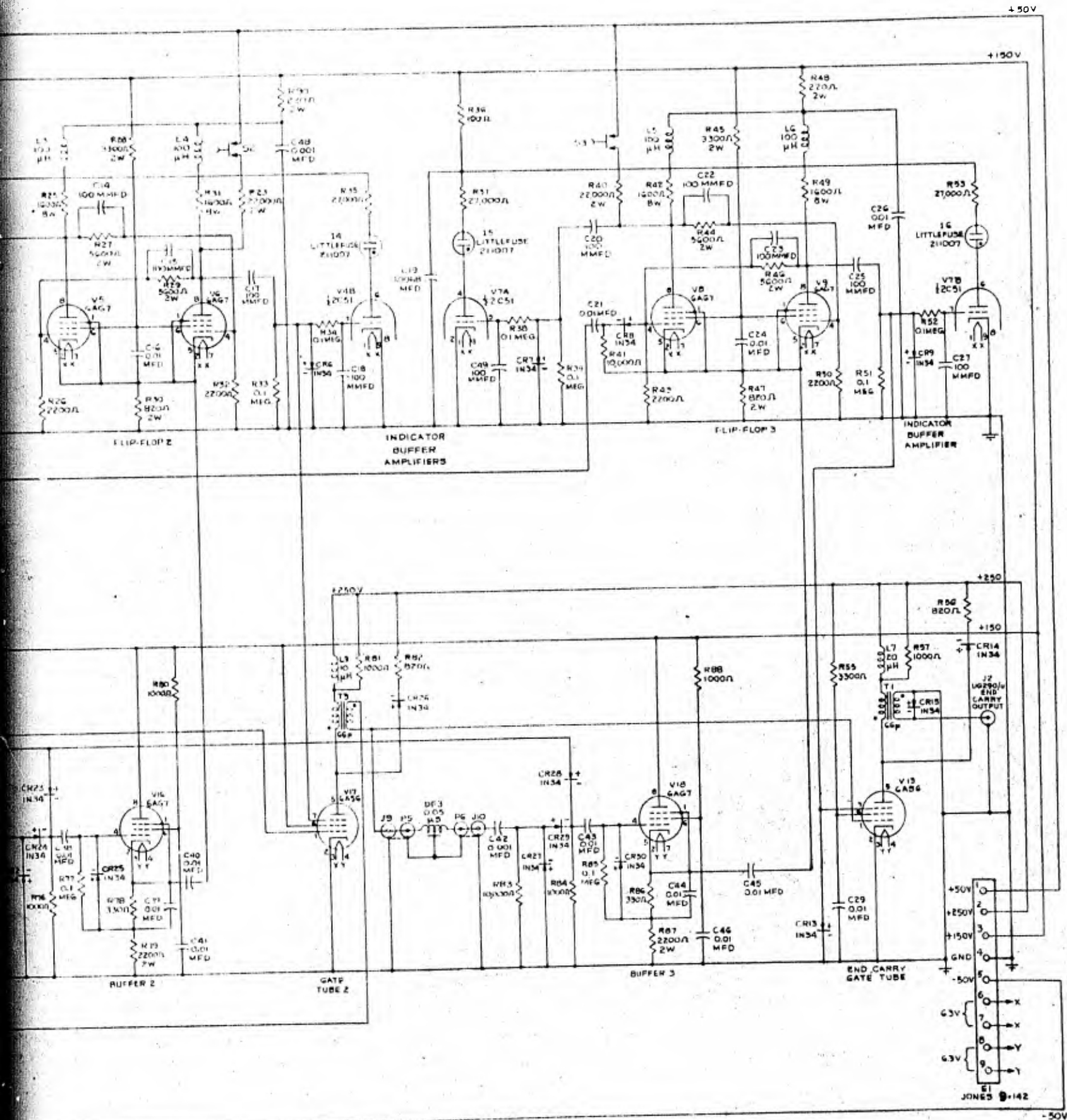
SERVOMECHANISMS LABORATORY OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345		
READ IN BUS		
SCALE: _____	DR. McHUGH-8-2747	
ENG. C.W.W. 8/28/47	CK.	APP. SB-39327

FB 27C
2 EIB 1-50





NOTE: ALL CAPACITORS ARE MICA.
ALL RESISTORS ARE 1/2 WATT 10%
TOLERANCE UNLESS OTHERWISE SPECIFIED.
DE1, DE2, AND DE3 ARE 91% IN



VACUUM TUBE AND MIC.
 RESISTORS ARE 1/2 WATT 10% UNLESS OTHERWISE SPECIFIED.
 SHIELD PIN 5 OF 2051'S MUST BE GROUNDING.
 AND DES ARE 9' INCH LENGTHS OF RG-62/U CABLE.

STEP COUNTER CIRCUIT SCHEMATIC II.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 SERVOMECHANISMS LABORATORY

6345
 OR F.B.
 10/2/47
 E-30884-1

D. 30878-1

TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL $\pm .005$ FRACTIONAL $\pm \frac{1}{16}$

WC

23 24 25

22

21

18 19 20

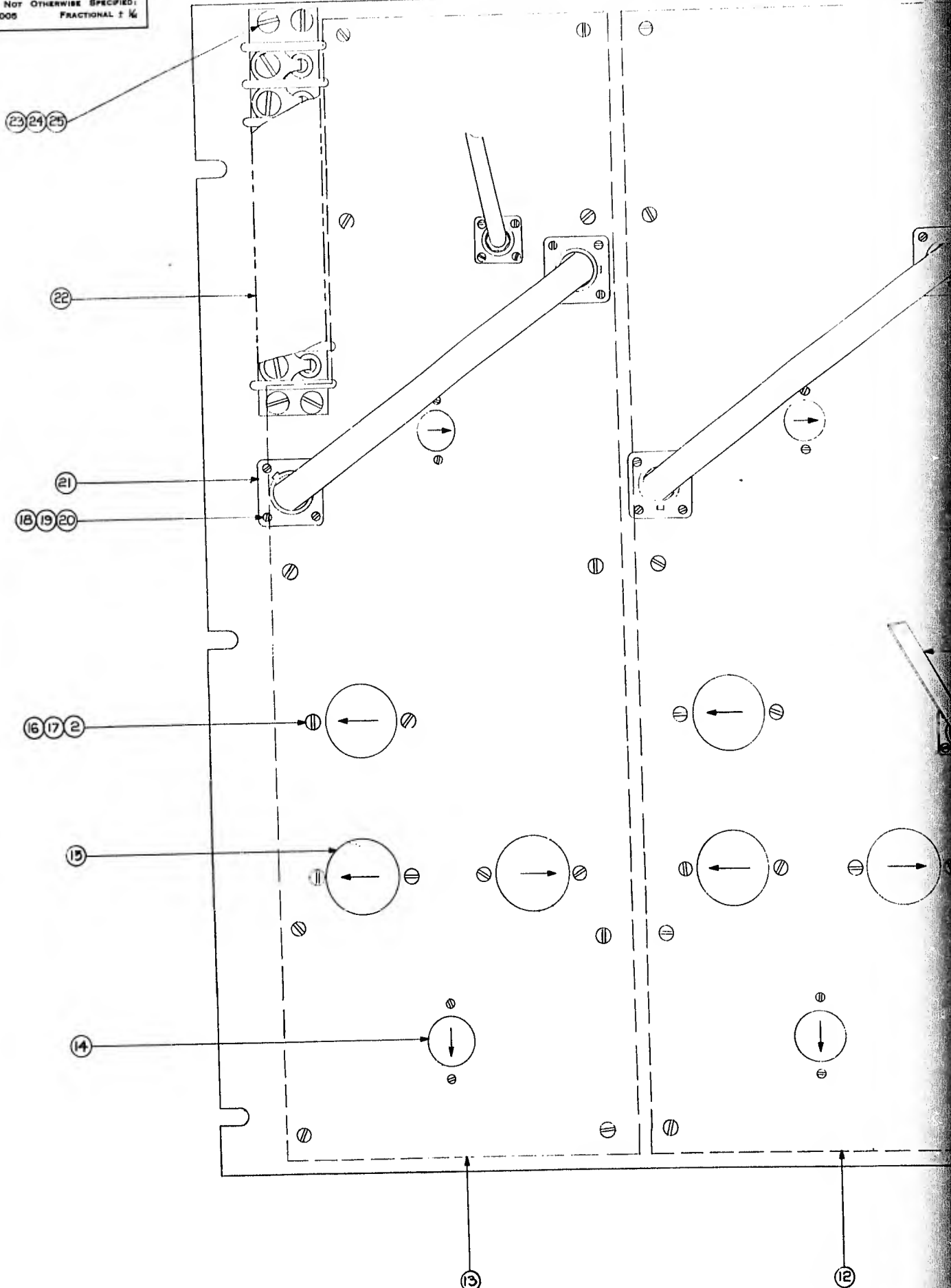
16 17 2

15

14

13

12



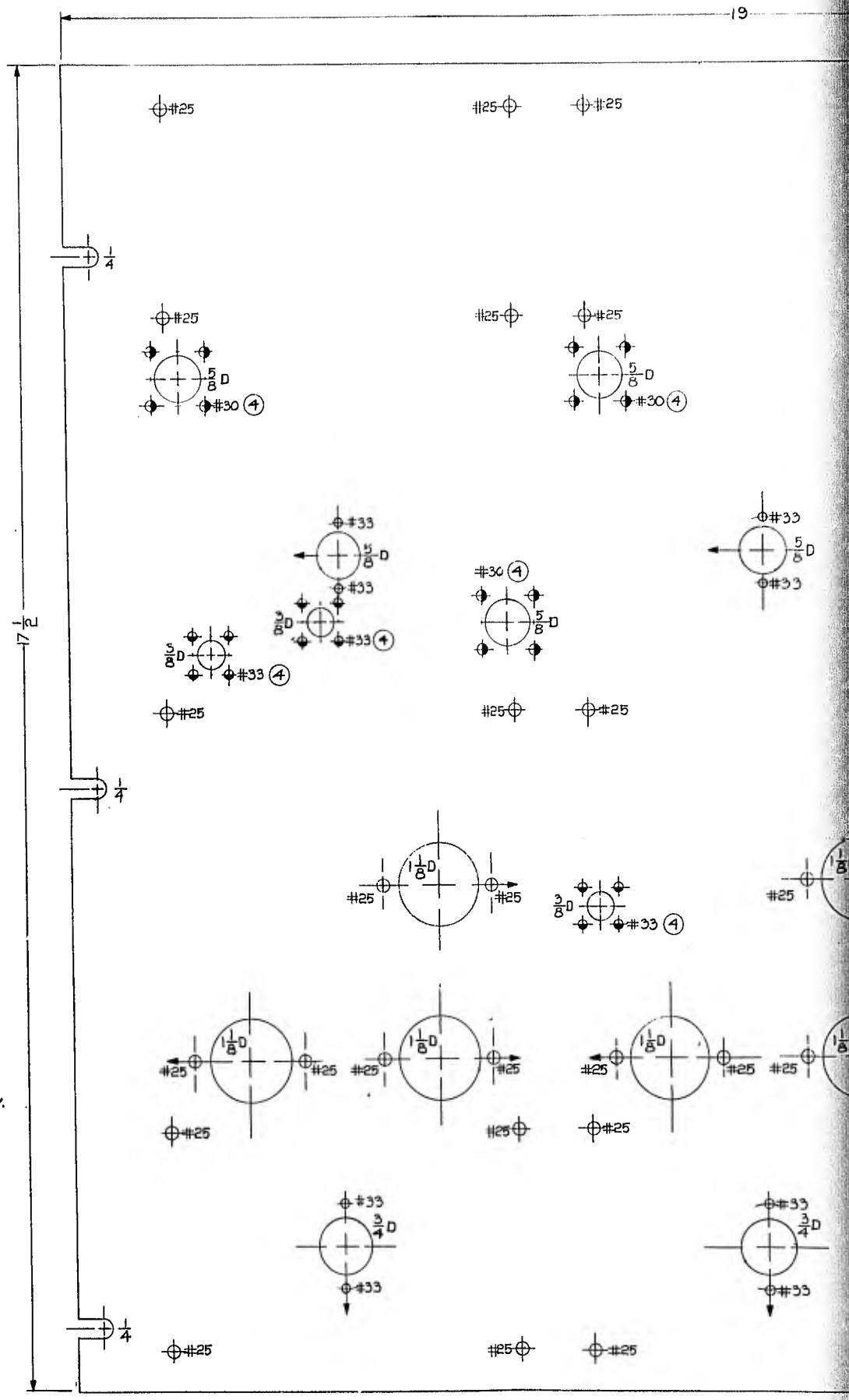
(12)

- NOTES: 1. THE EXACT LENGTH OF RG/6275 CABLE WILL BE DETERMINED BY ENGINEER.
2. ARROWS INDICATE DIRECTION OF SOCKET KEY.

25	HEX NUT	#8-32		4
24	LOCKWASHER	#3 SHAKEPROOF	#1708	4
23	RD. HD. SCREW	#8-32		4
22	JONES STRIP		#142-9	1
21	DELAY LINE CONNECTORS		PL259A	6
20	HEX NUT	#4-40		24
19	LOCKWASHER	#4 SHAKEPROOF	#1704	24
18	RD. HD. SCREW	#4-40 1/2 LG		24
17	HEX NUT	#6-32		18
16	BD. HD. SCREW	#6-32 1/2 LG		18
15	TUBE SOCKET(6AG7)	CINCH	#9661	9
14	TUBE SOCKET(2C51)	CINCH	#8259A	3
13	SUB PANEL	#3	C-30868	1
12	SUB PANEL	#2	C-30867	1
11	SUB PANEL	#1	C-30866	1
10	HEX NUTS	#3-56		12
9	MAIN PANEL		D-30875	1
8	INPUT AND OUTPUT CABLES	RG/6275		NOTE 1
7	LOCKWASHER	#3 SHAKEPROOF	#1703	28
6	RH. SCREW	#3-56 1/2 LG		28
5	CABLE CONNECTORS	CARO	UG/260	4
4	TUBE SOCKET(6AG6)	CINCH	#9335	3
3	DELAY LINE CABLE	9 1/2" LG.	RG/65/U	3
2	LOCKWASHER	#6 SHAKEPROOF	#1706	48
1	BH. HD. SCREW	#6-32 3/4 LG.		30

P				Q			
N				F			
M				E			
L				D			
K				C			
J				B			
H				A			
DES	APP.	DATE		DES	APP.	DATE	

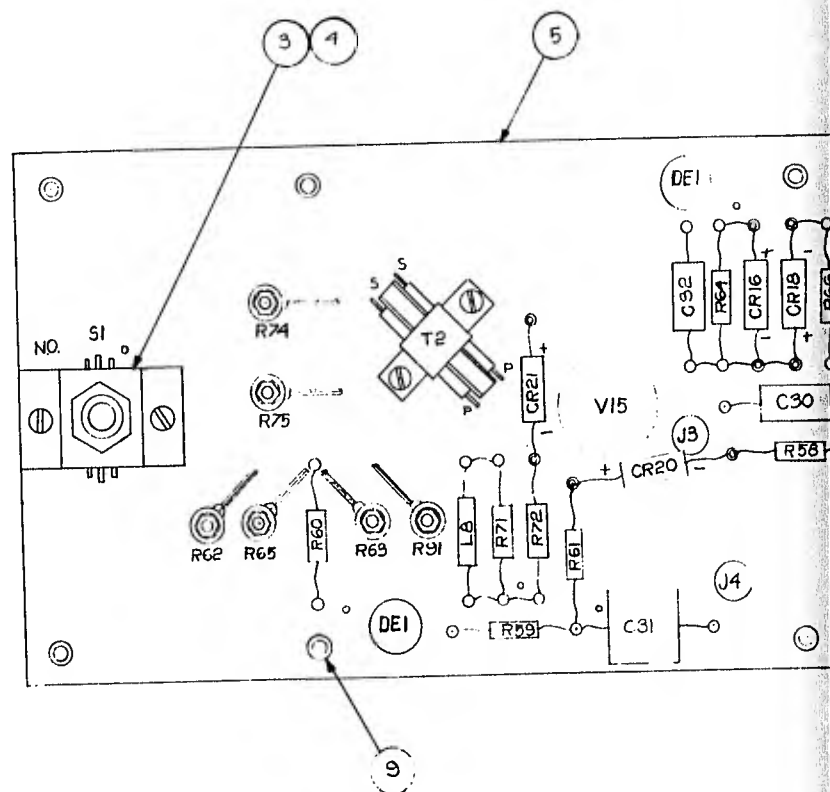
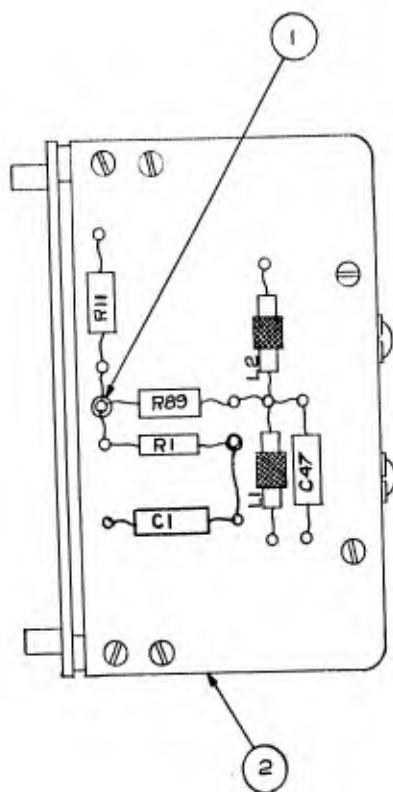
SERVOMECHANISMS LABORATORY OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY DIVISION OF INDUSTRIAL COOPERATION PROJECT NO.			
FRONT VIEW OF MAIN PANEL OF STEP-COUNTER			
SCALE: FULL		DR. R.V. WESTON 10-11-47	
TR.	CR.	APP.	D-30878-1



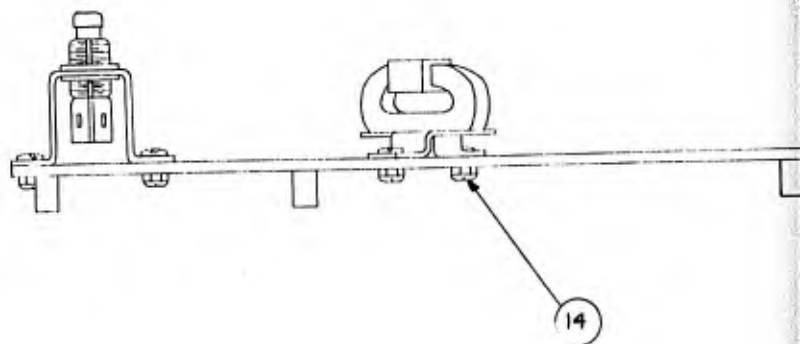
NOTE : ARROW HEADS INDICATE
DIRECTION OF SOCKET KEY.
PANEL MOUNTING SLOTS
ARE 1/2" DEEP.

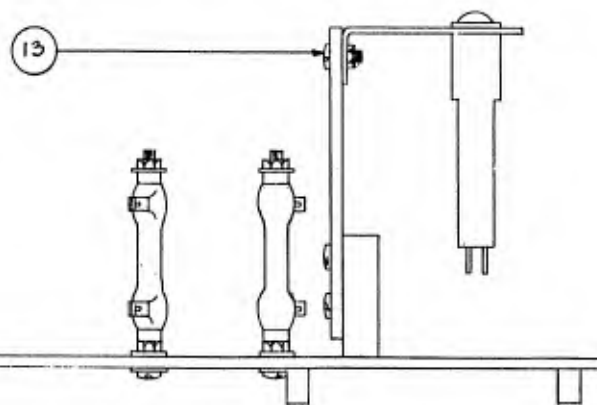
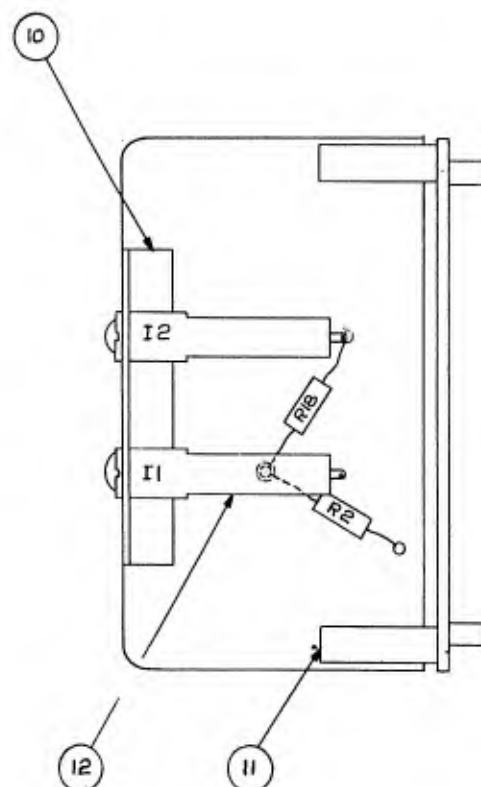
D-30849-1
WO

TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL $\pm .005$ FRACTIONAL $\pm \frac{1}{16}$



NOTE:
DE, J AND V NUMBERS ARE
FOR REFERENCE ONLY.





14	6-32 ELASTIC STOP NUT TYPE	395-62	4
13	6-32 FASTENINGS	—	2
12	INDICATOR KELLOO	#49	2
11	MOUNTING POST	A3015	2
10	INDICATOR MTG. PLATE	A3072	1
9	PANEL MOUNTING POST C.T.C.	#1846D	10
8	8-32 FASTENINGS	—	8
7	HOLLOW TURRET LUG C.T.C.	#1558C	1
6	SINGLE TURRET LUG C.T.C.	#1724D	6B
5	TERMINAL BOARD	C-30866	1
4	PUSH-BUTTON I.C.A.	#1282	1
3	PUSH-BUTTON MTG. BRKT.	A30840	1
2	TERMINAL BOARD	A30865	1
1	DOUBLE TURRET LUG C.T.C.	#1091A	2
ITEM	MATERIAL - DESCRIPTION	PART NO.	QUAN.

P				Q			
N				F			
M				E			
L				D			
K				C			
J				B			
H				A			
	WAS	APP.	DATE		WAS	APP.	DATE

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 DIVISION OF INDUSTRIAL COOPERATION PROJECT NO.

PANEL 1 OF STEP-COUNTER ASSY

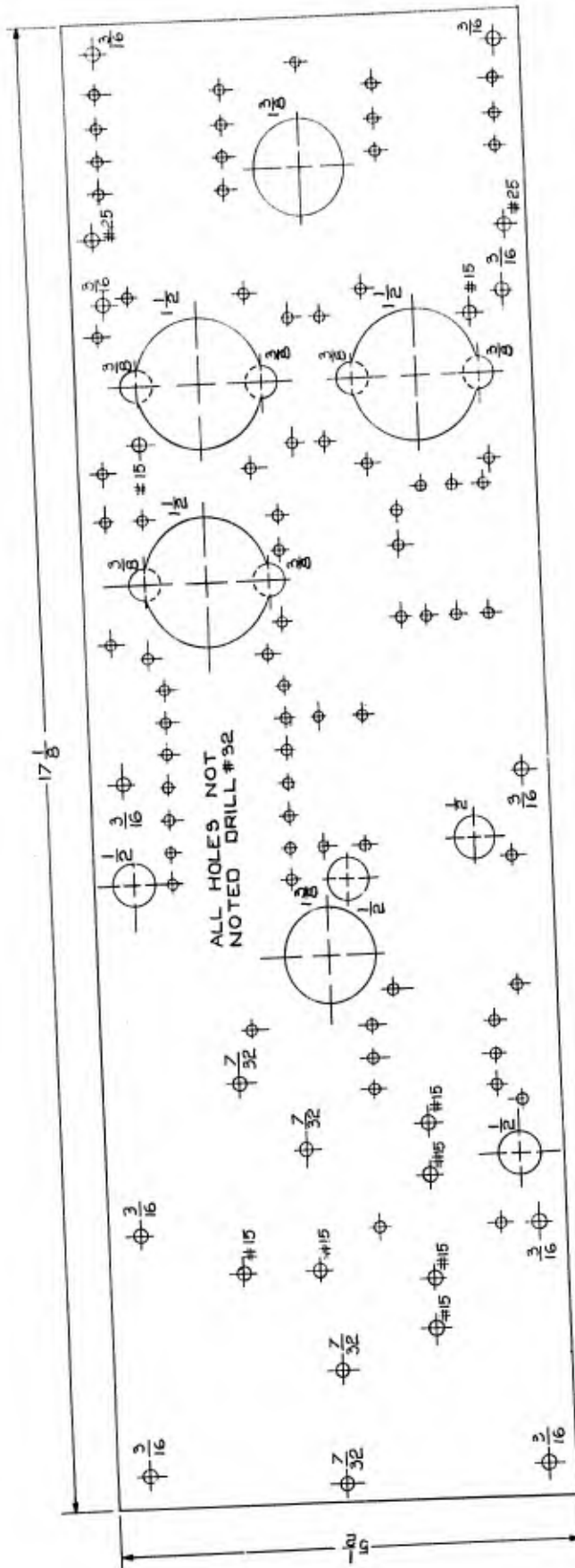
SCALE: FULL	DR. RY Weston 9/24/17
-------------	-----------------------

TR.	CH.	APP.
	E.L.B.	

D- 30849-1

C-30866

USED IN ASSY 0-30849



NOTES:
MATERIAL - 1/8" THICK GRADE LE BLUE-LINE
LINEN-BASE BAKELITE.

SERVO-MECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

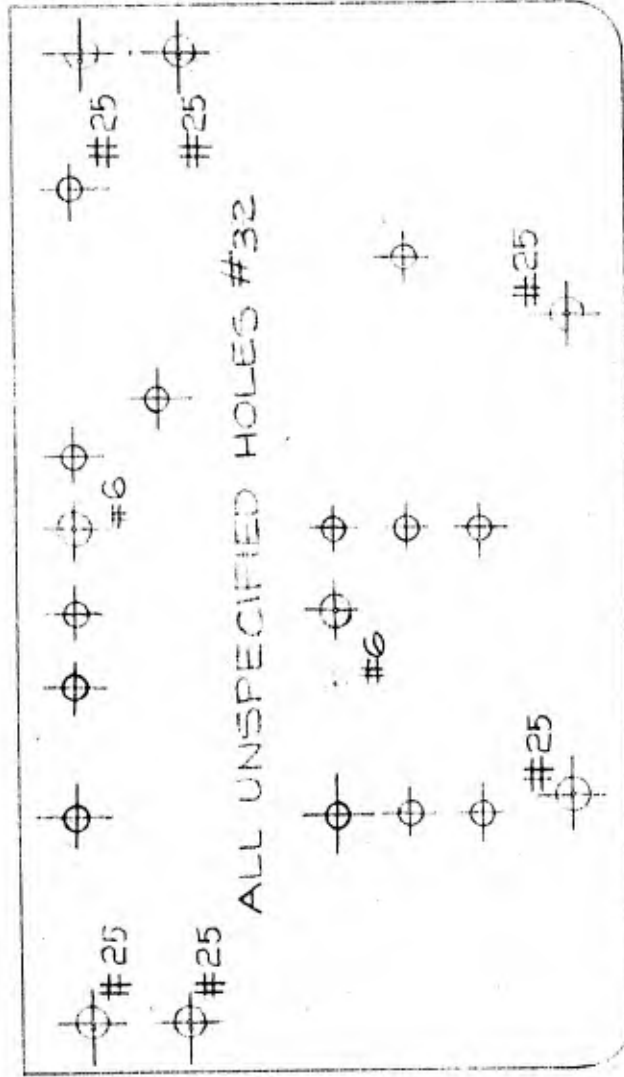
DRILLING TEMPLATE OF STEP-COUNTER PANEL I

SCALE: FULL SIZE
DATE: 9/28/47
BY: EAG

C-30866-1

A-30865-1

D-30847, B, & 9



NOTES:
 MATERIAL - $\frac{1}{8}$ " THICK GRADE LE
 LINEN-BASE BLUE-LINE BAKELITE
 ROUND OFF INDICATED
 EDGES APPROXIMATELY $\frac{1}{4}$ " R.

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

DRILLING TEMP - STEP-COUNTER VERT BOARD

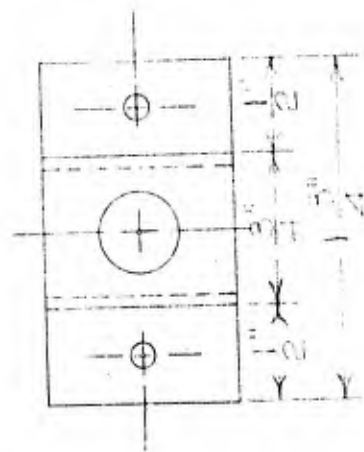
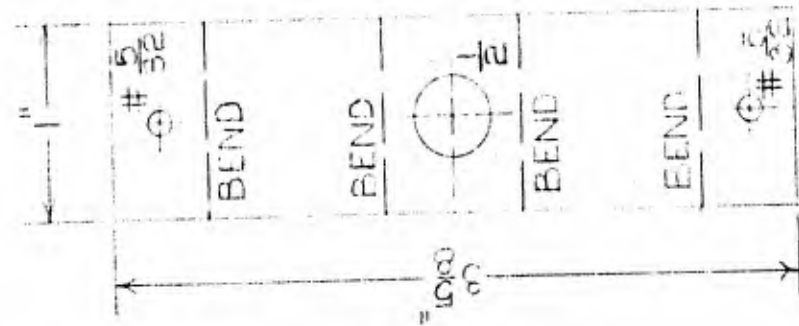
SCALE: FULL DR. R. Weston 9/8/47

ENC. *LAB* CK. APP.

A-30865-1

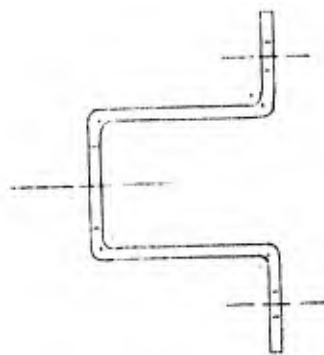
A-30840-1

D-30847, 48, AND 49



NOTES:

MATERIAL - 1/8" ALUMINUM.
BEND ALL VIEWS 90°



SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

PUSH-BUTTON MTS. DRAW.

SCALE: FULL DR. RIVESTON 9-2-47

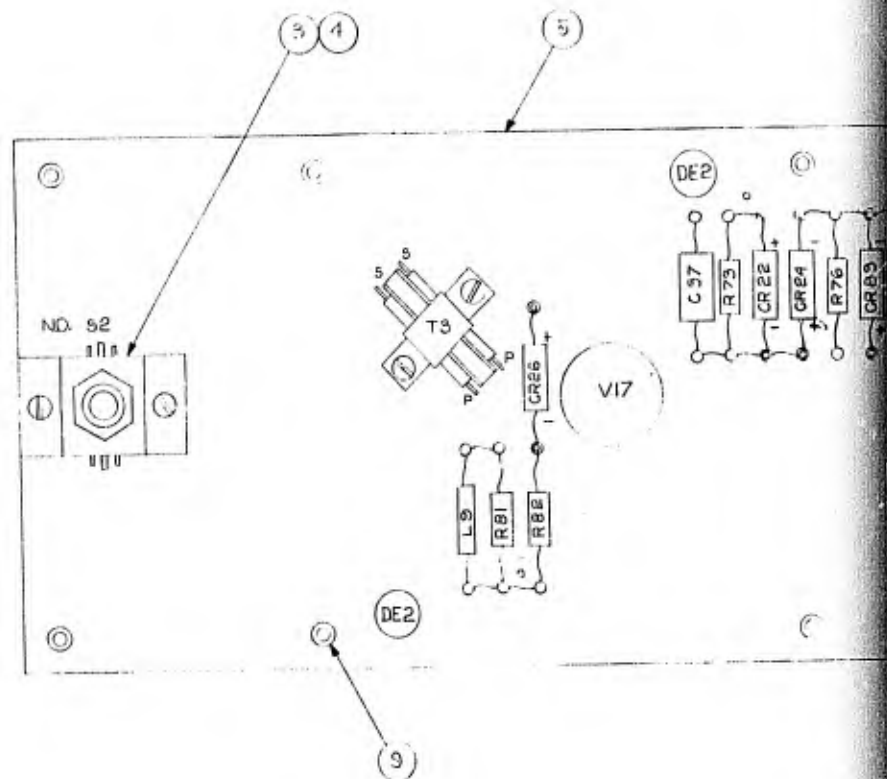
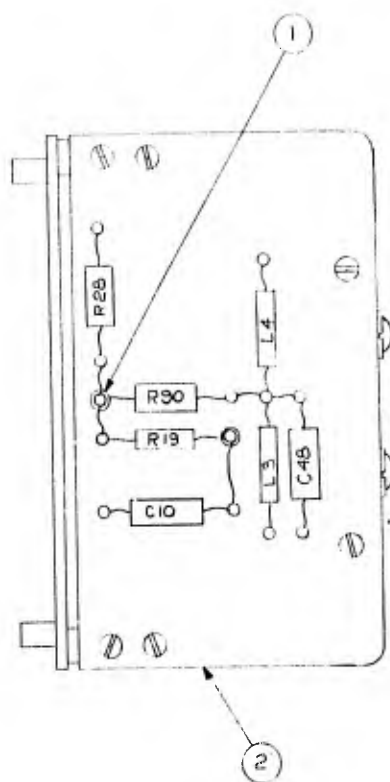
ENC. *EB* CK. APP.

A-30840-1

D-30847-1

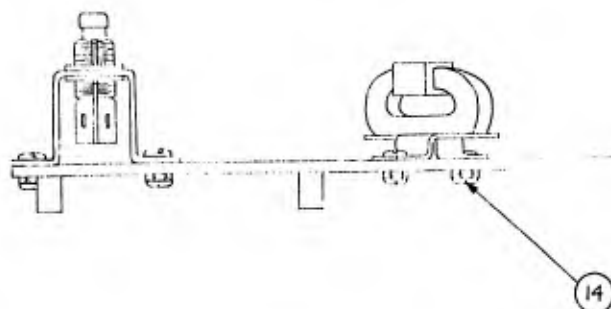
TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL ± .005 FRACTIONAL ± 1/16

WO



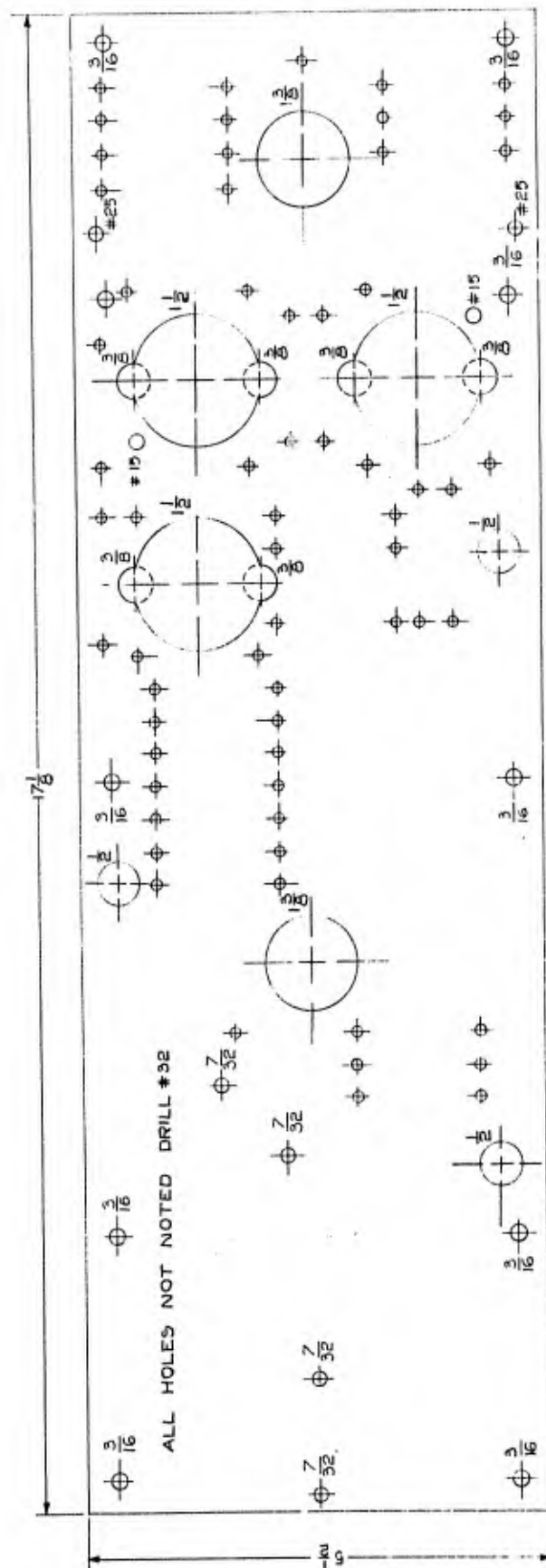
NOTES:

DE, J AND V NUMBERS ARE
FOR REFERENCE ONLY.



C-30867-

USED IN ASSY D-30847



NOTES: MATERIAL - 1/8 THICK GRADE LE BLUE-LINE
LINEN-BASE BAKELITE.

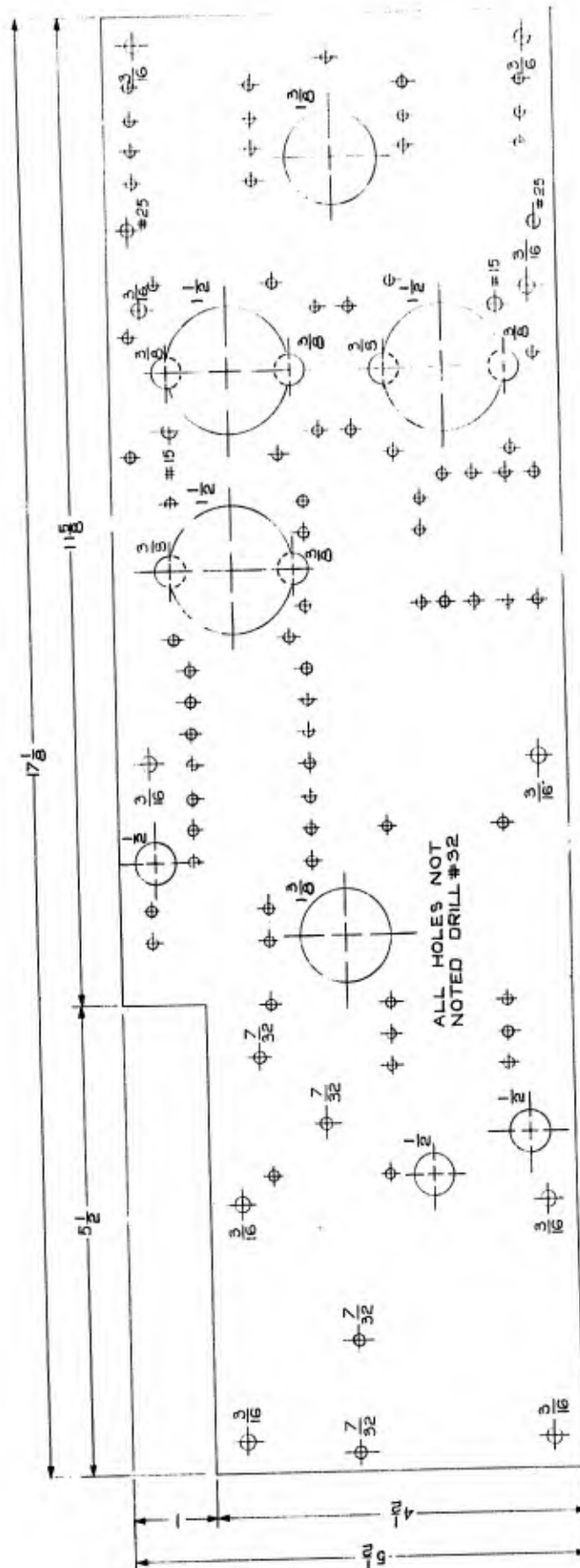
SERVO MECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

DRILLING TEMPLATE OF STEP-COUNTER PANEL 2

SCALE: FULL DR. R. W. S. 3-1-7
C-30867-1

C-30868

USED IN ASSY D-30848



NOTES: MATERIAL - 1/8 THICK GRADE LE BLUE-LINE
LINEN-BASE BAKELITE.

MECHANICAL LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 63-5

DRILLING TEMPLATE OF COUNTER PLATE 3

SCALE: FULL	DR. R. J. 95/47	APP.
5/13		

C-30868-1

REGISTER DRAWING LIST

(Block Diagram Reference 102, 103, 601)

Drawing List	SA-39292
Block Schematic	D-30773
Panel and Cable Plan	R-30797
601 Check Register	
Block Schematic	SB-39288
Circuit Schematic	SD-39282
Assembly	D-30798

REGISTER PANEL

LIST OF DRAWINGS

REGISTER PANEL

BLOCK SCHEMATIC
MAIN PANEL & CABLE
PLAN LAYOUT

D-30773
R-30797

CHECK REGISTER

BLOCK SCHEMATIC
CIRCUIT SCHEMATIC
DRILLING TEMPLATE & ASS'Y

B-39288
SD-39282-2
D-30798

PROGRAM REGISTER

BLOCK SCHEMATIC
CIRCUIT SCHEMATIC
DRILLING TEMPLATE & ASS'Y

B-39289
SD-39283-2
D-30799

PROGRAM COUNTER

BLOCK SCHEMATIC
CIRCUIT SCHEMATIC
ASSEMBLY

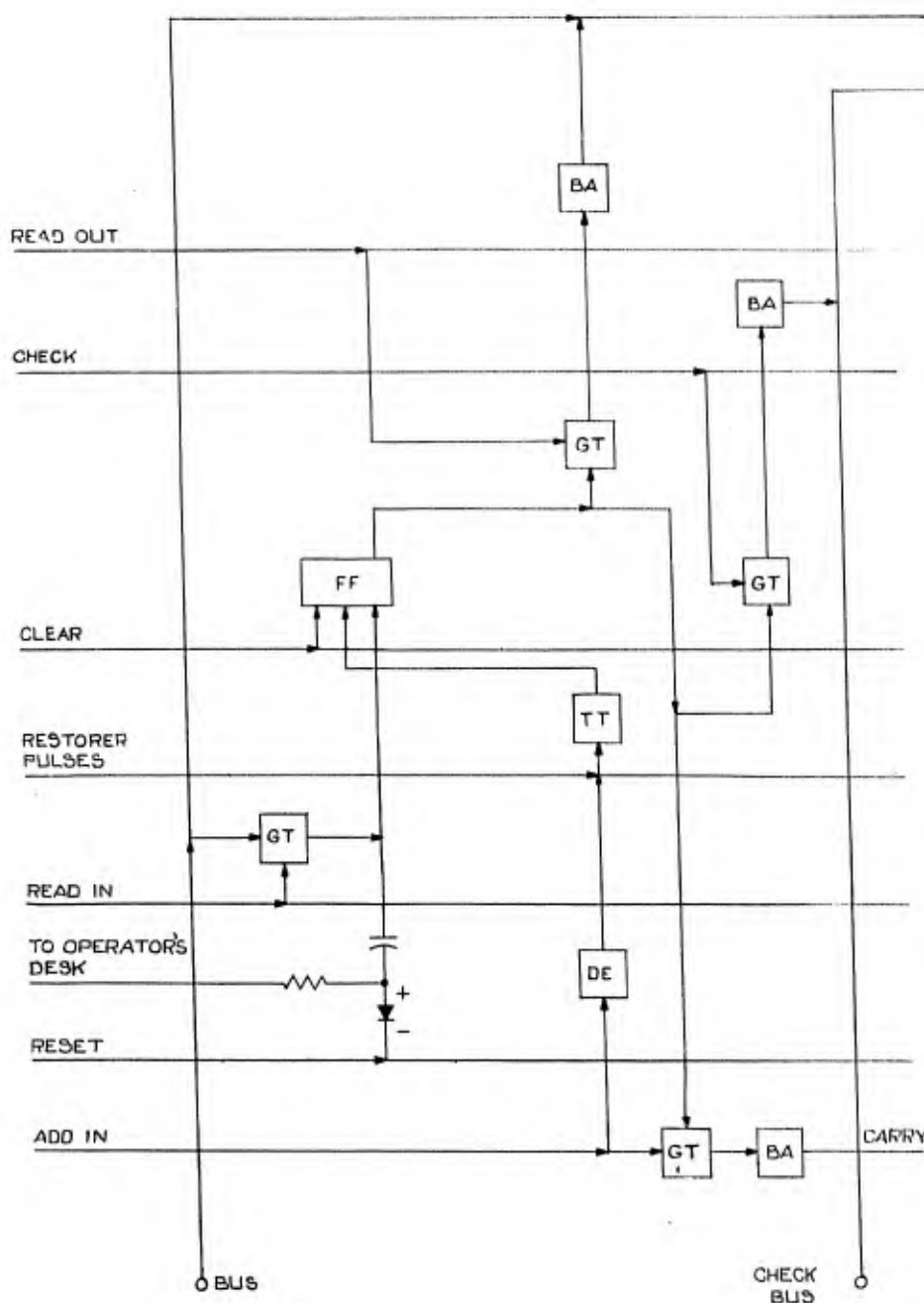
B-39291
SD-39284-2
D-30800

MASSACHUSETTS INSTITUTE OF TECHNOLOGY	
DATE 8/19/47	BY R.K.
NO. 345	REV. 1/13
SA-39292-2	

SA-39292-2

PROGRAM COUNTER

PROGRAM REGISTER



CHECK

RESTORE PULSES

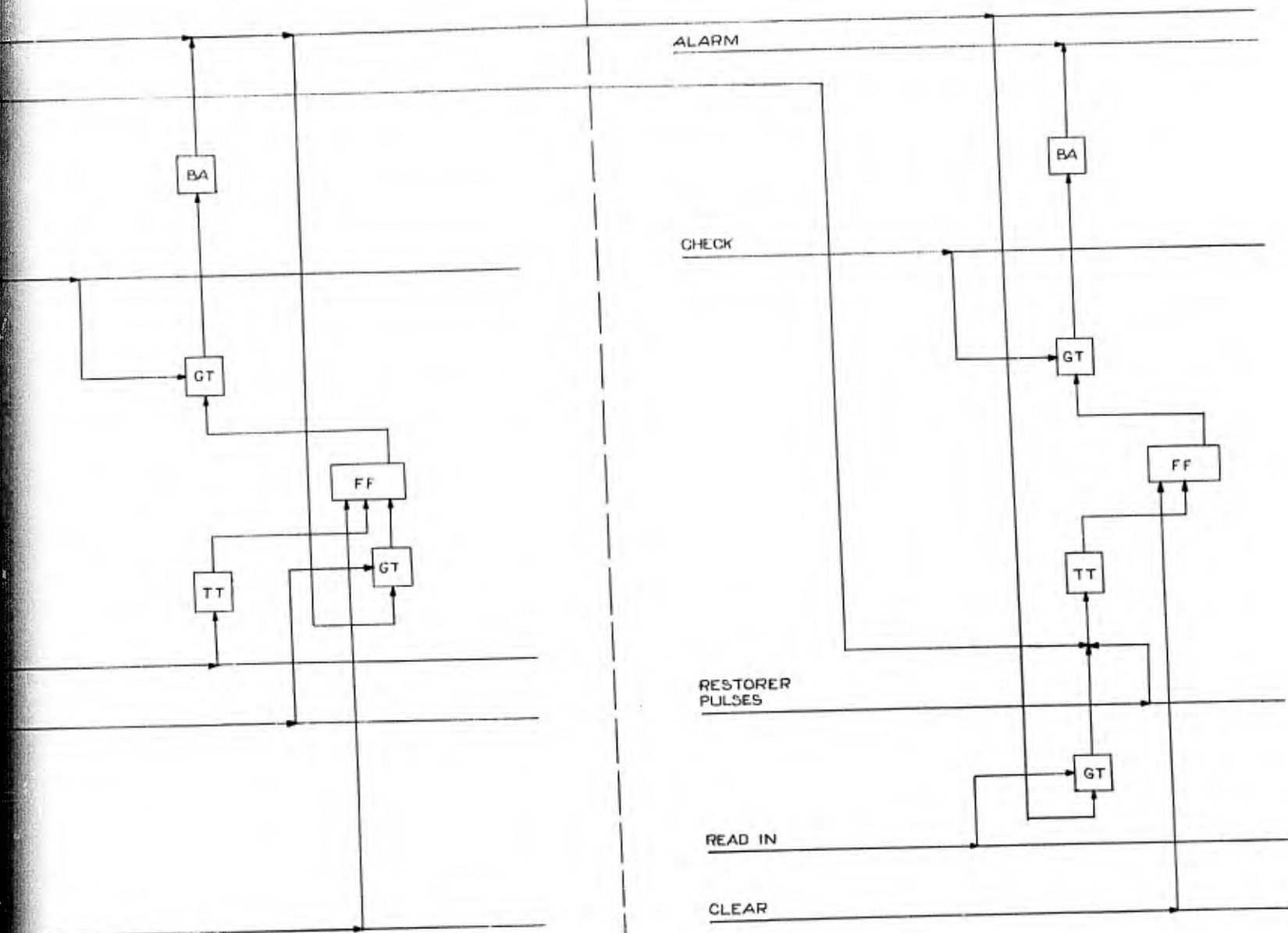
READ IN

CLEAR

REGISTER PANEL

PROGRAM REGISTER

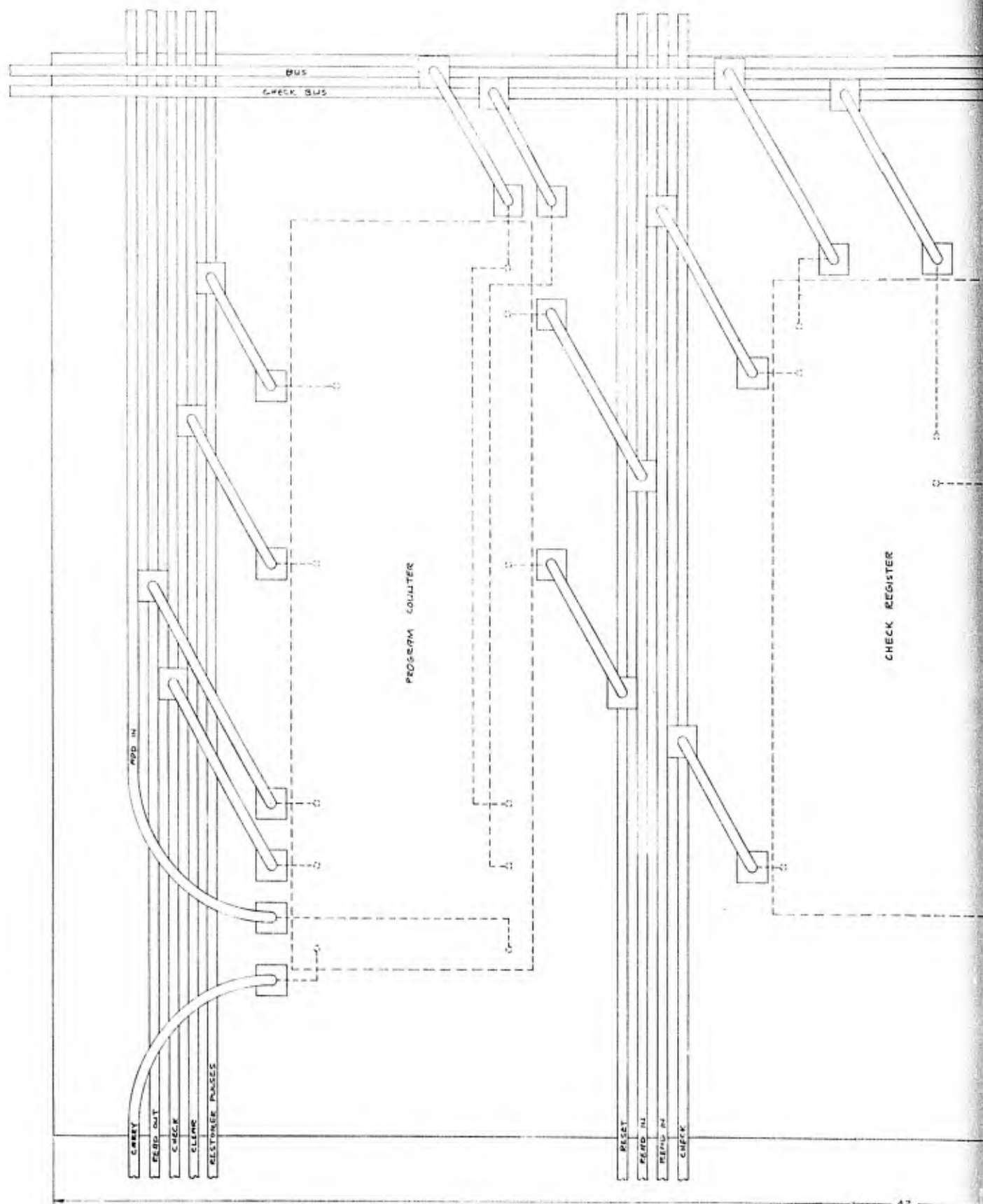
CHECK REGISTER

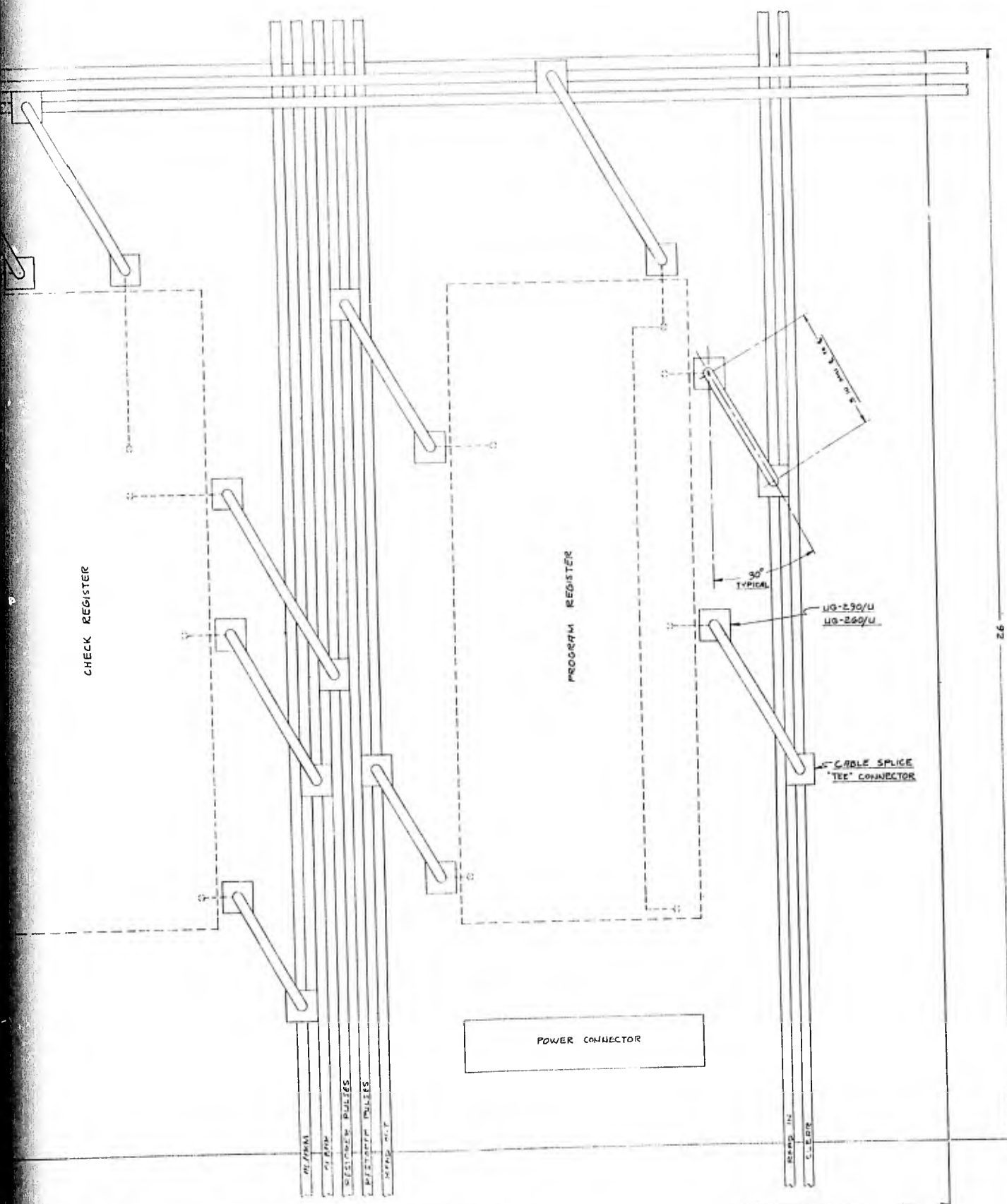


STER PANEL BLOCK SCHEMATIC

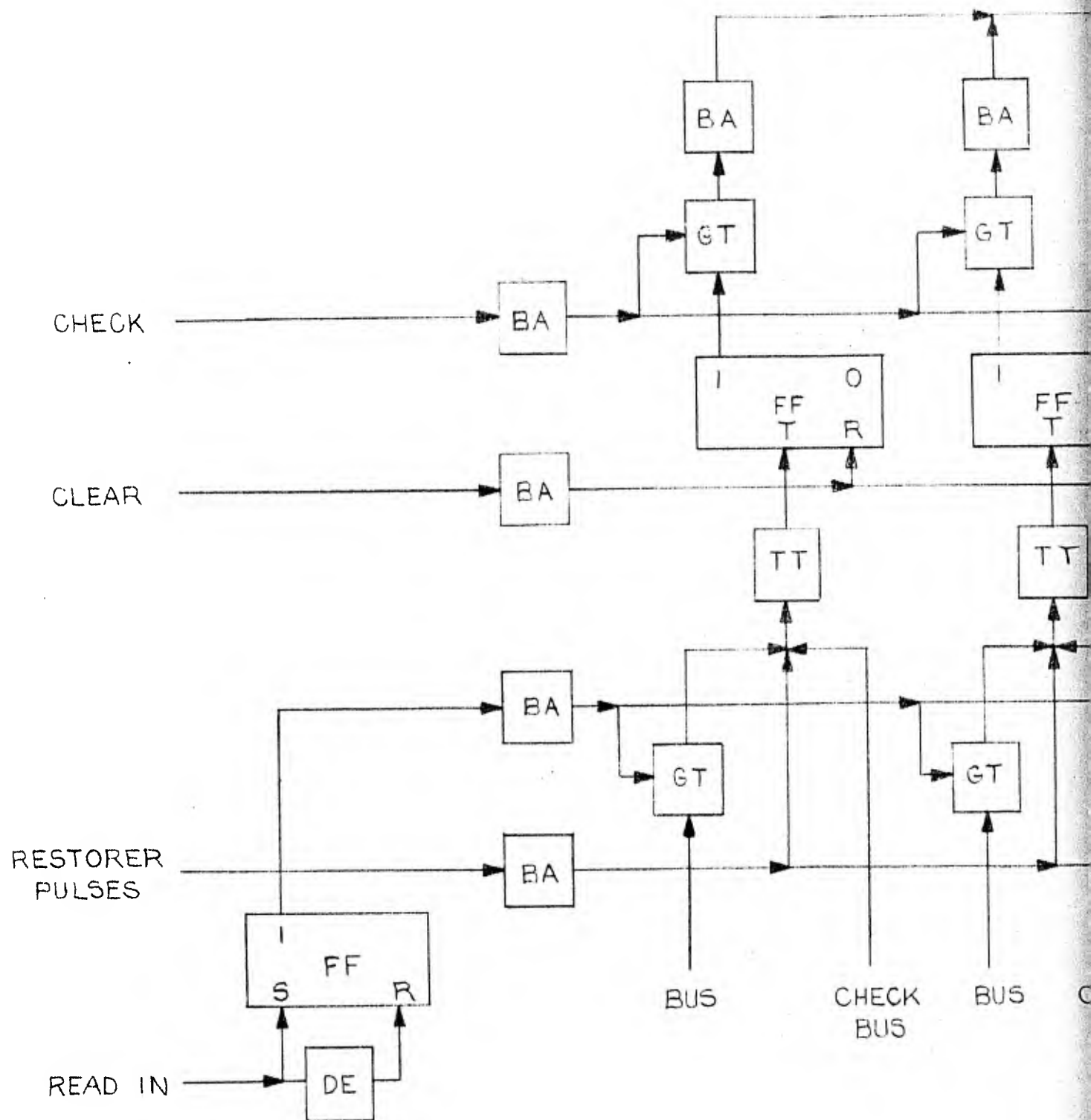
MASSACHUSETTS INSTITUTE OF TECHNOLOGY			
RAYTHEON RESEARCH LABORATORY			
8-584	DR	RVW	CH
DRP	APP	D-30773	✓

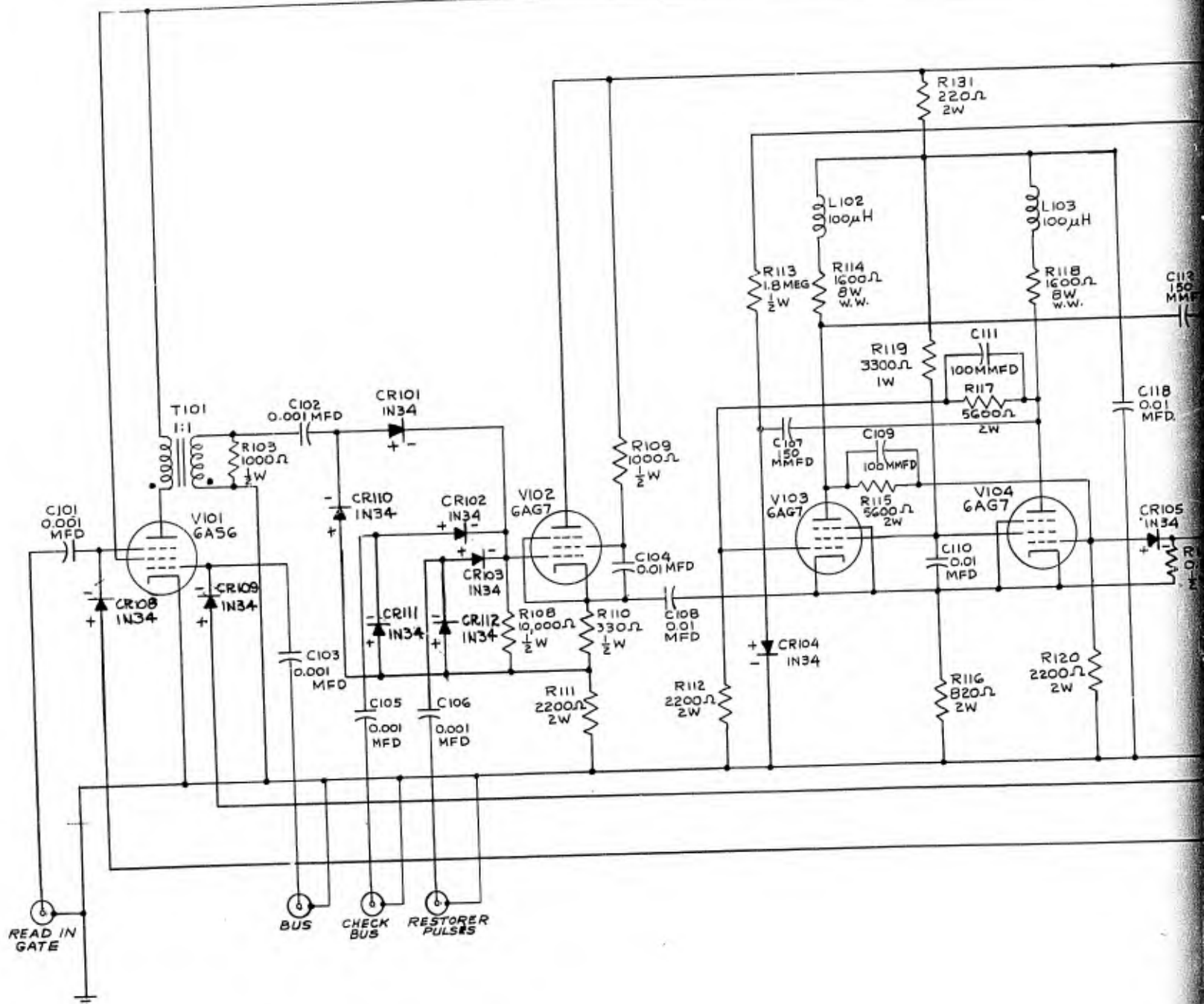
2

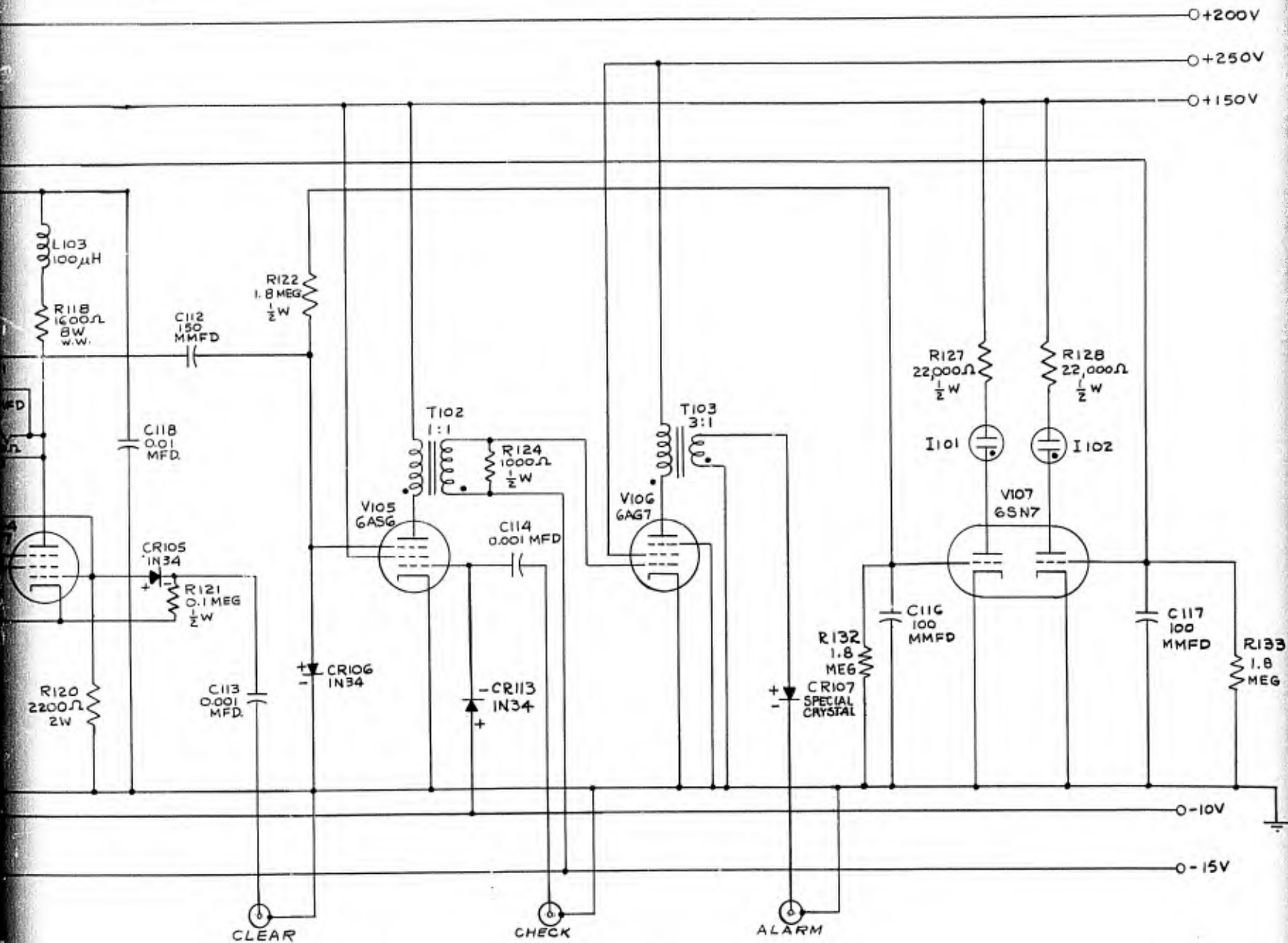




REGISTER MAIN PANEL & CABLE PLAN

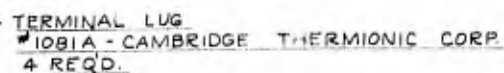




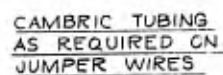


CHECK REGISTER
CIRCUIT SCHEMATIC

USED IN ASS'Y SD-39282

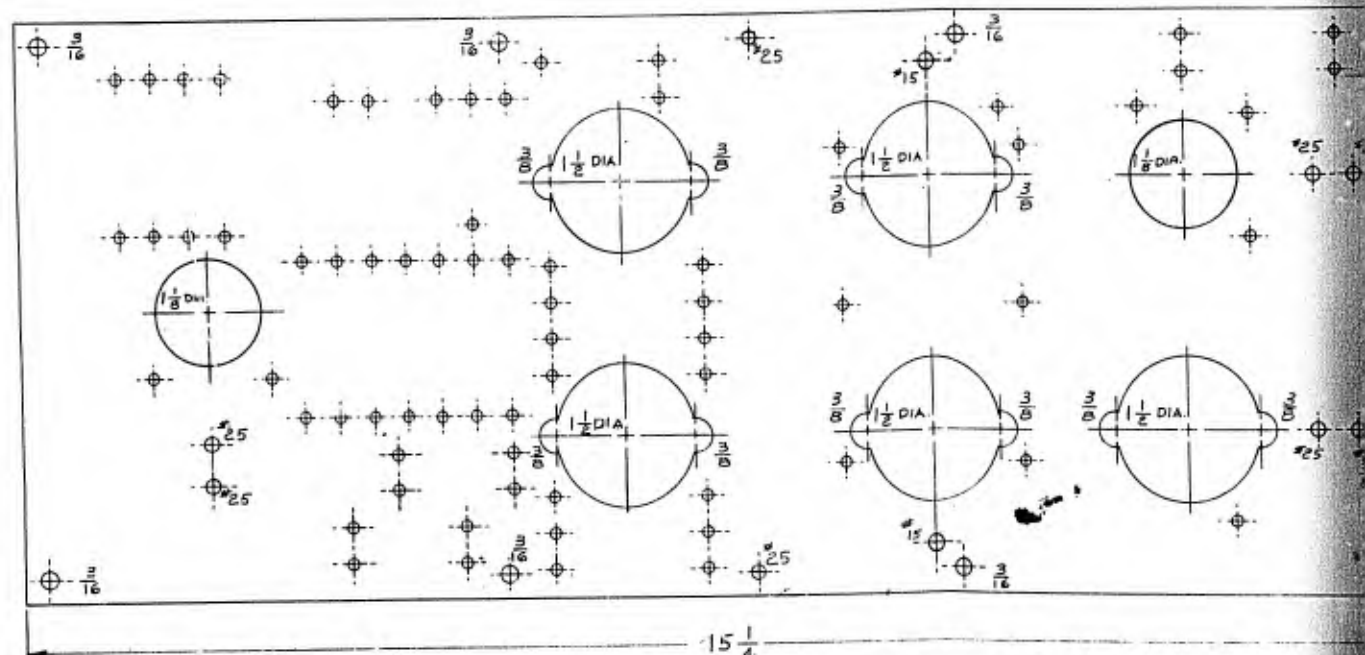


22 REQ'D
SOLDER ALL CRYSTAL PIGTAILS
INTO LUG AS SHOWN.

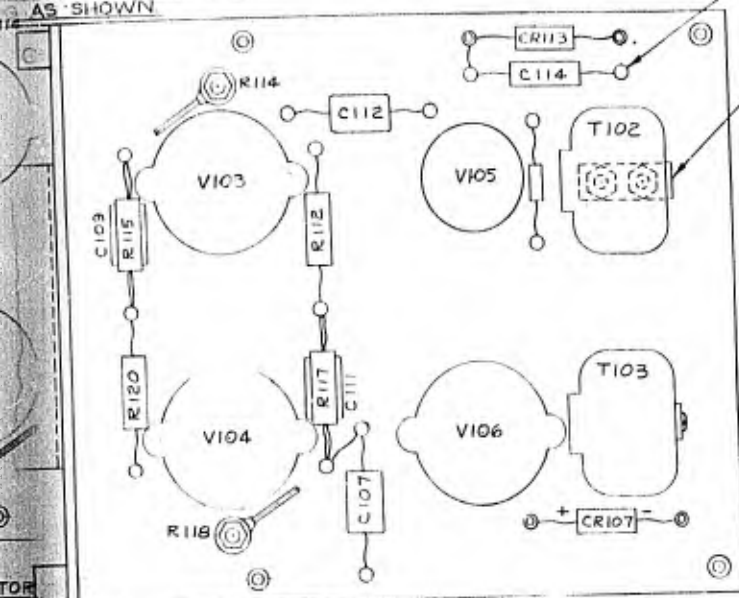


PANEL MTG. POST
2 REQ'D.
SEE A-30754

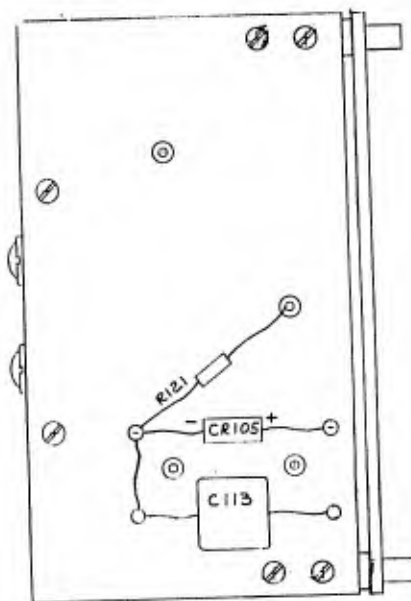
INDICATOR
SEE A-3



CRYSTAL PIGTAILS
AS SHOWN



TRANSFORMER MTG. ANGLE
3 REQ'D.
SEE A-30753

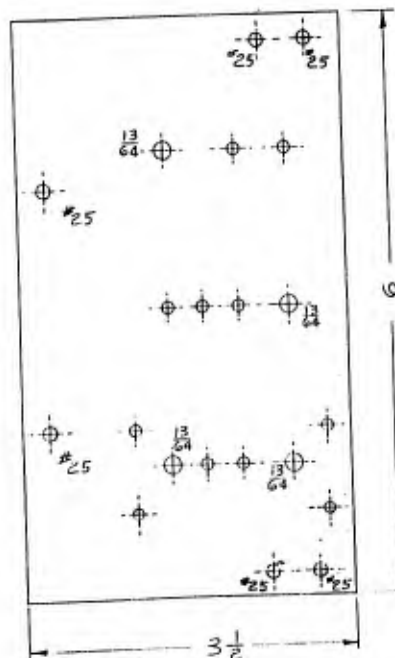
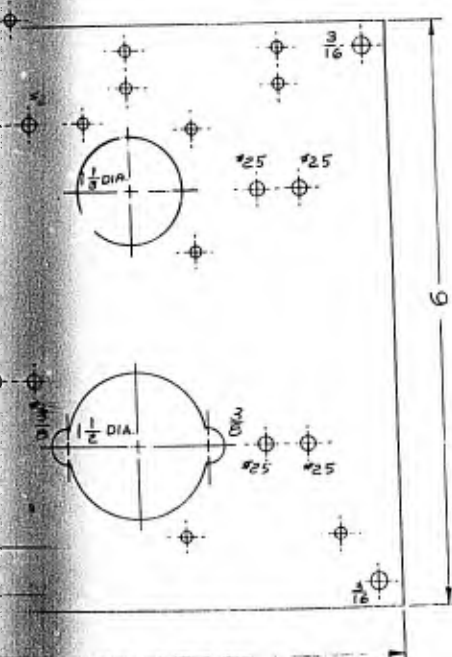


8-32 FASTENINGS
ALL OTHER #6-32

PHENOLITE SPACER
4 REQ'D

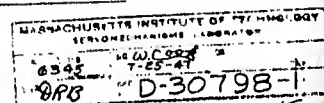
ASSY NOTE
1, V101, V102, V103, V104, V105, V106, & V107,
ARE NOT PARTS OF THIS ASSY &
ARE INDICATE FOR REFERENCE ONLY.

STANDOFF - RIVET TYPE
C.T.C. # 1246D
8 REQ'D.



NOTES
1. MAT'L - 1/8 TH'K LINEN BASE PHENOLITE
2. HOLES NOT NOTED DRILL #33

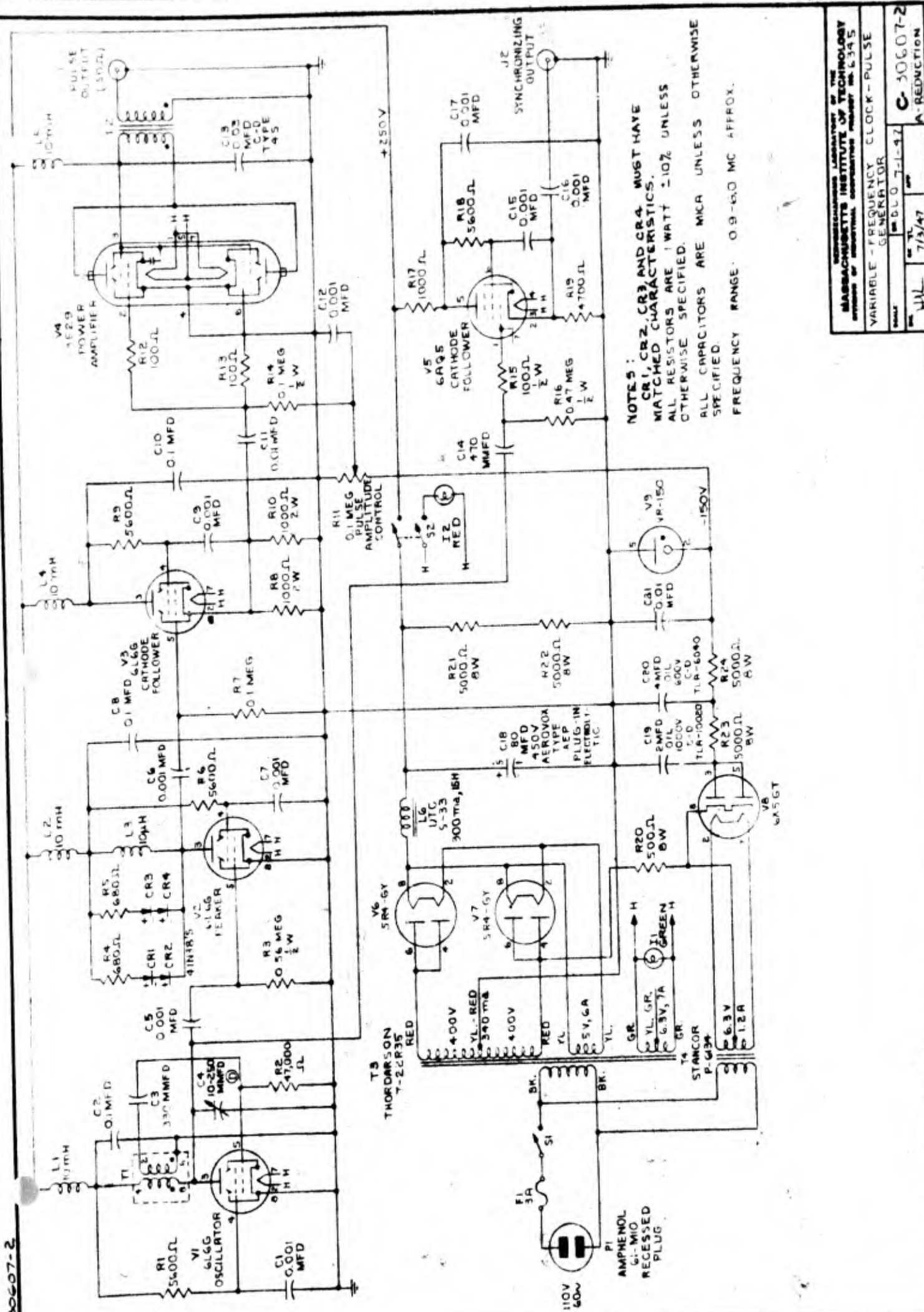
CHECK REGISTER DRILLING
TEMPLATE & ASS'Y.



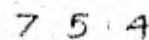
TEST EQUIPMENT DRAWING LIST

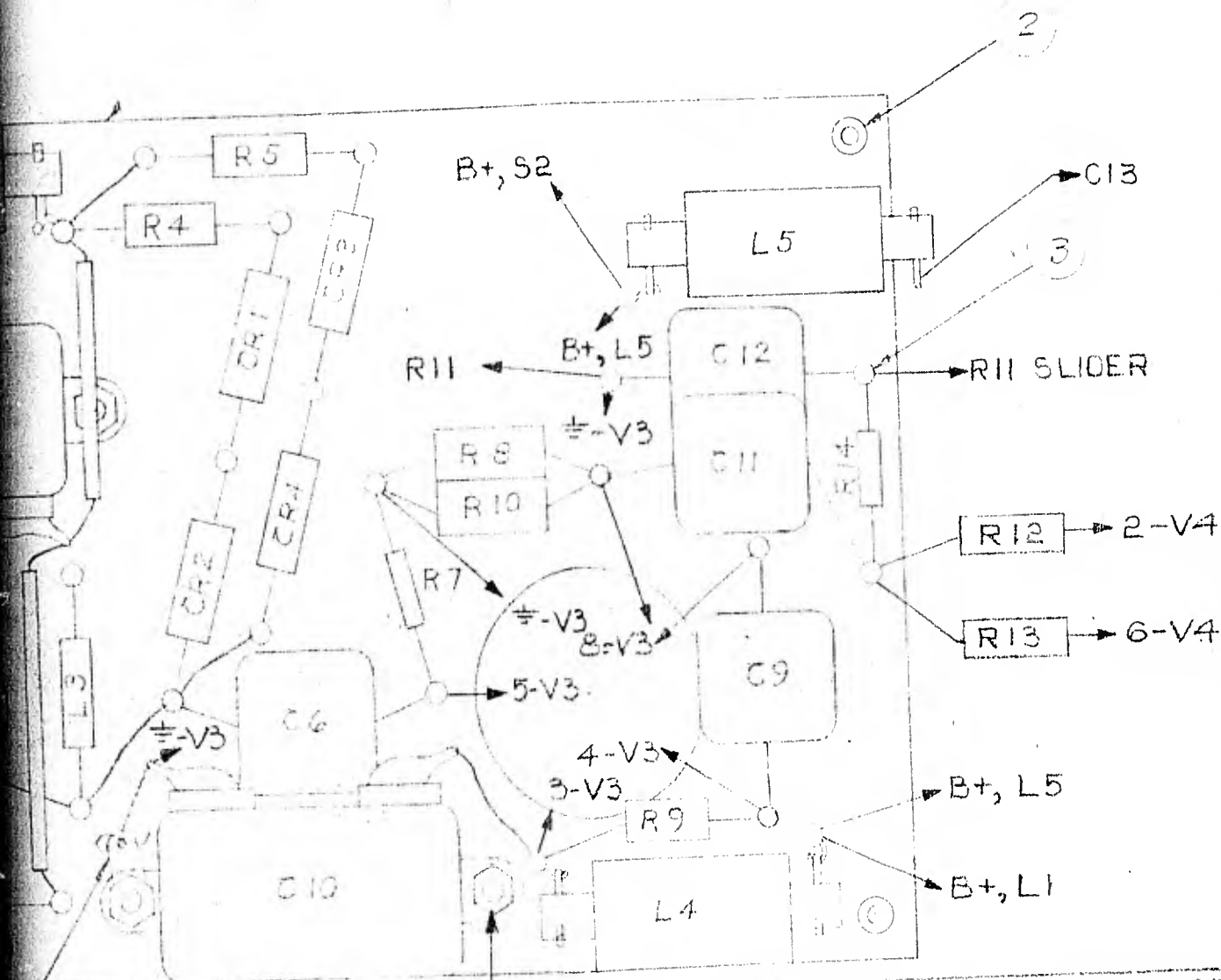
Variable Frequency Clock Pulse Generator, Vol. 19, E-48

C-30607	A-30749
B-30821	A-30843
B-30820	A-30810
A-30822	A-30827
A-30814	A-30748
A-30823	A-30811
A-30813	A-30845
A-30815	B-30825
A-30816	A-30842
A-30817	A-30844
A-30818	A-30826
A-30819	A-30841
A-30846	E-30618
B-30824	C-30620
A-30750	A-31090
	A-38250



MASSACHUSETTS INSTITUTE OF TECHNOLOGY	
DEPARTMENT OF ELECTRICAL ENGINEERING	
VARIABLE-FREQUENCY CLOCK-PULSE GENERATOR	
DATE	7-1-47
BY	WHL
7/3/47	
C-30607-2	A-REDUCTION

ELECTRICAL PARTS LIST



SERIAL NO.	VALUE
C10	0.1 MFD, OIL
C11	0.01 MFD, MCA
C12	0.001 MFD, MCA
C14	470 PFD, MCA
C15, C16, C17	2.01 MFD, MCA
L1, L2	10 mH
L3	10 mH
L4, L5	10 mH
CR1, CR2	IN38
CR3, CR4	IN38

8	LOCK WASHER #6 SHAKEPROOF		2
7	HEX NUT 6-32 N.C.-2		4
6	B'D. H'D. MACH. SCR. 6-32 N.C.-2 1/4 LG.		1
5	B'D. H'D. MACH. SCR. 6-32 N.C.-2 3/8 LG.		4
4	SHAKEPROOF LUG #6	2101-6	3
3	TURRET LUG	CTC 1724-D	44
2	MOUNTING POST CTC	X-1246-D	6
1	TERMINAL BOARD	B-30821	1
ITEM	MATERIAL - DESCRIPTION	PART NO.	QUAN.

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

TERMINAL BOARD ASSEMBLY FOR VARIABLE
 FREQUENCY CLOCK-PULSE GENERATOR

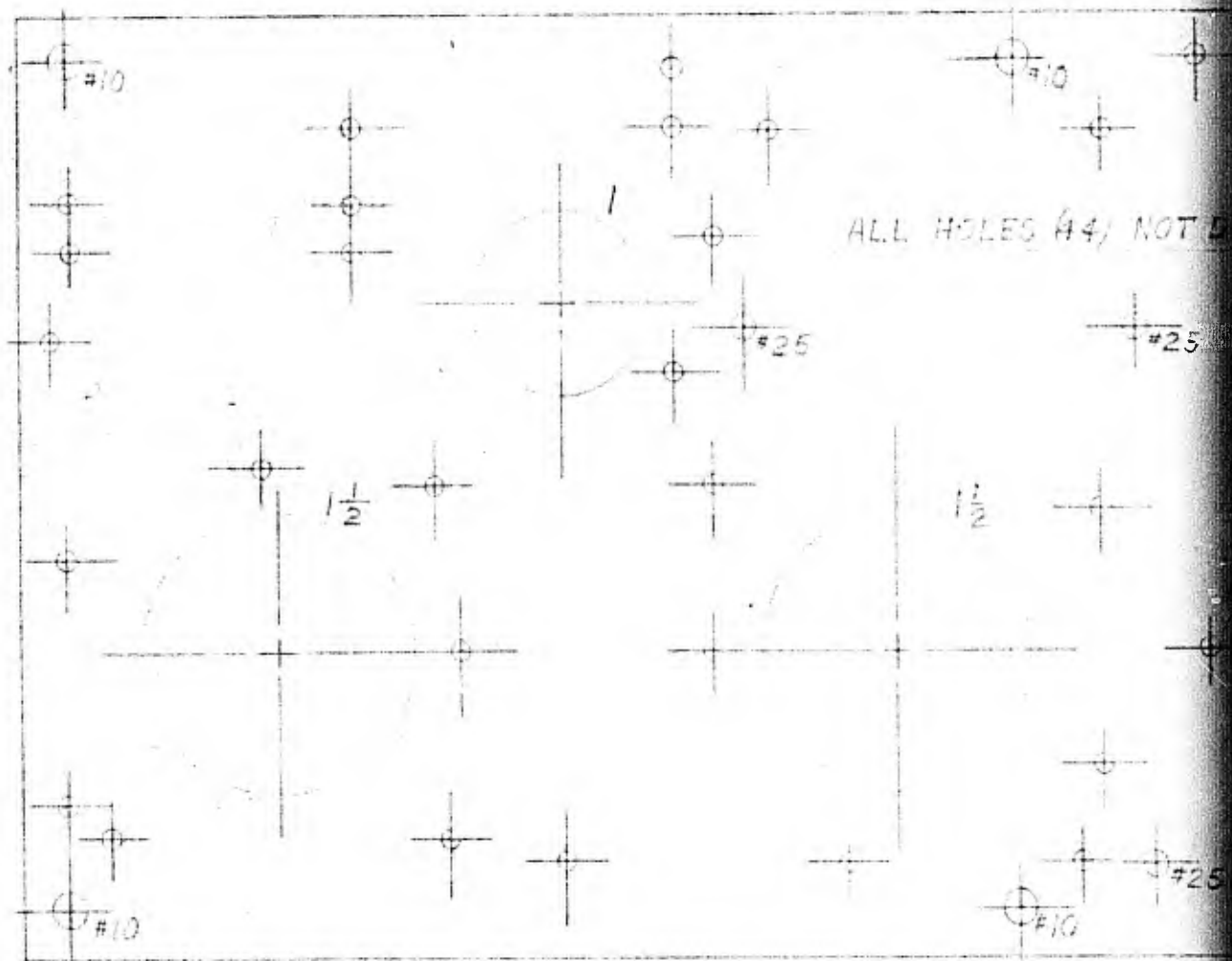
SCALE: DR. P.M.G. 8-20-47

ENG. HIC CK. R.B.M. 10/14/47 APP.

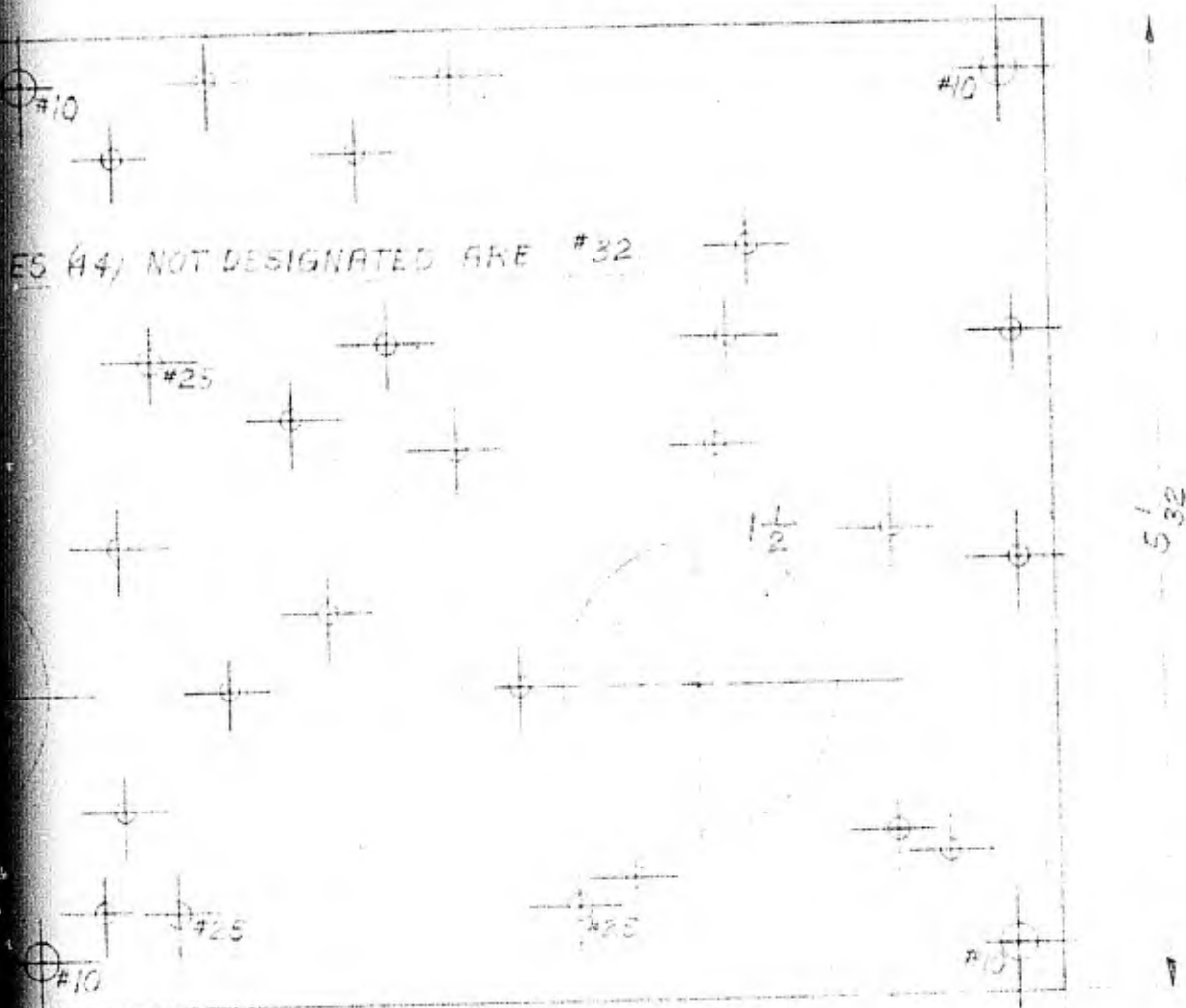
B-30821

B-30820

USED IN ASSY B-30821



11 5



ES (44) NOT DESIGNATED ARE #32

MATERIAL - $\frac{1}{8}$ LINEAL BAKELITE

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6845

DRILLING TEMPLATE FOR
 TERMINAL BOARD VARIABLE FREQ CLOCK PULSE GEN.

SCALE: 1 : 1

DR. P. M. G. 5-20-47

ENG.

HK

CK. R. H. G. M.

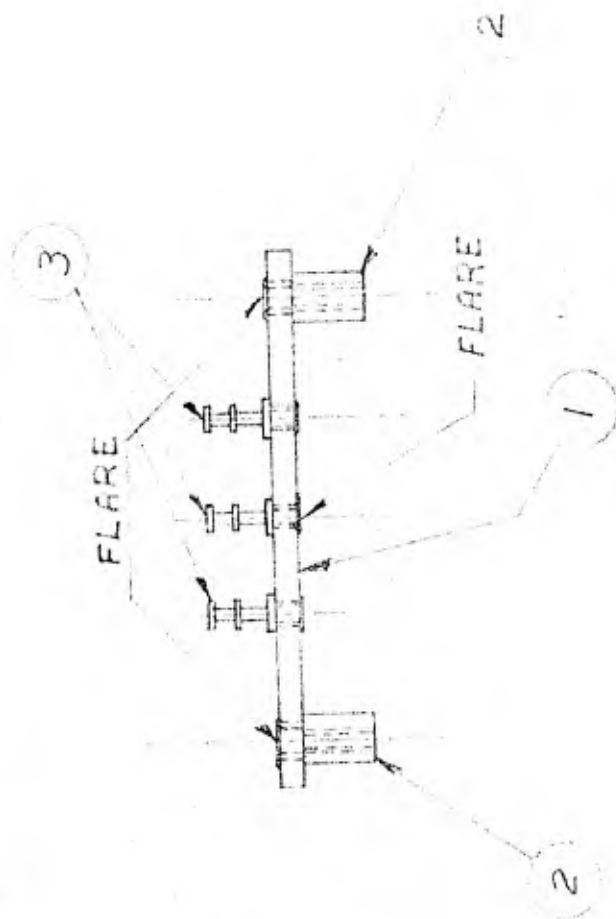
10/14/47

APP.

B-30820

TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL + .005 FRACTIONAL $\pm \frac{1}{64}$

44-38861-1057 B-31021

[illegible]

3	TURRET LUG	CTC.	A-1724-D	3
2	MOUNTING POST	CTC	A-1244-D	2
1	TERMINAL STRIP		A-30814	1
ITEM	MATERIAL - DESCRIPTION		PART NO.	QUAN.

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

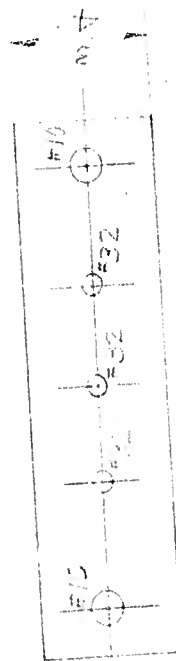
3-TERMINAL STRIP ASSY

SCALE: 1:1	DR. R.H.G. B-23-47
TR. #1C	CK. R.H.M. 10/14/47
APP.	

A-30822

A-30814

LOAD IN ASS 1 B-30822



3 1/4

MATERIAL - 1/8 LINEAR BRASS

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 345

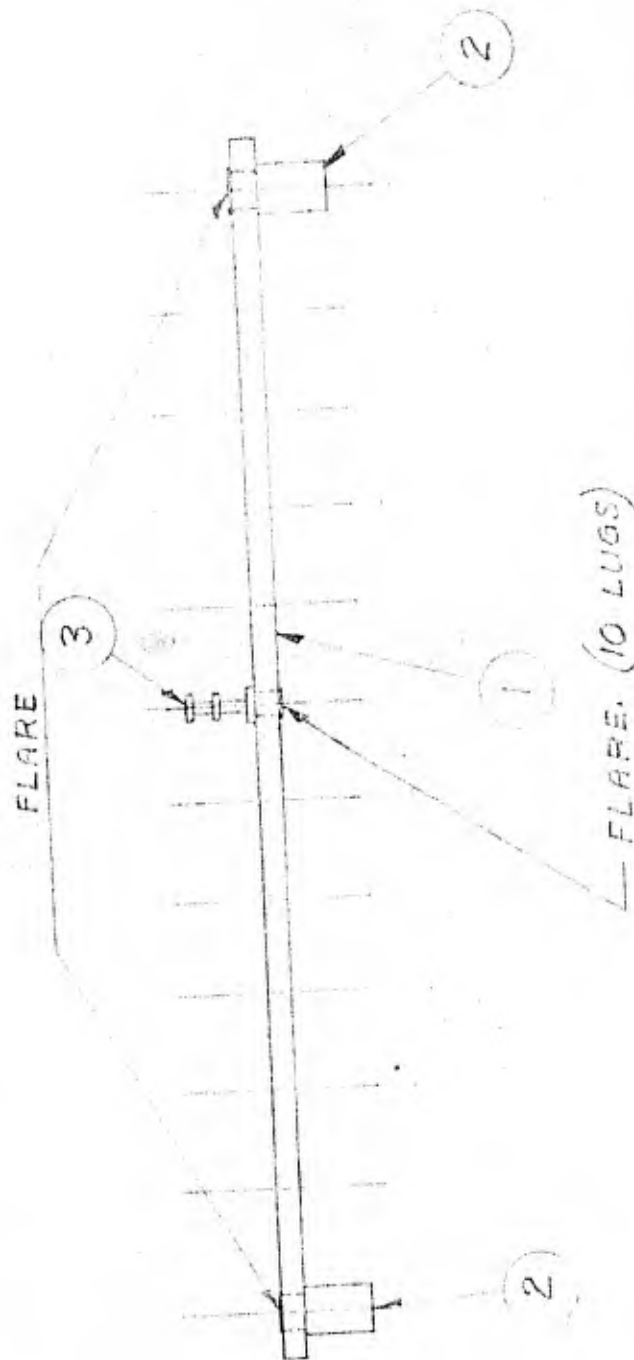
5-TERMINAL STRIP 1/8 LINEAR BRASS

SCALE: 1:1		DR. P.M.G. 2-21-47	
ENG. HK		CK. HKM	
APP.		A-30814	

TOLERANCES NOT OTHERWISE SPECIFIED:
FRACTIONAL $\pm \frac{1}{64}$

WO-

U.S. DEPT. OF JUSTICE
B-31021



3	TURRET LUG	CTC	#124-D	10
2	MOUNTING POST	CTC	#X-1246-D	2
1	TERMINAL STRIP		A-30813	1
				QUAN.
				PART NO.

MATERIAL - DESCRIPTION	QUANTITY	UNIT	PRICE	TOTAL
1. 1000 LBS. OF 100% COTTON	1000	LBS.	1.00	1000.00
2. 1000 YDS. OF 100% COTTON	1000	YDS.	1.00	1000.00
3. 1000 YDS. OF 100% COTTON	1000	YDS.	1.00	1000.00
4. 1000 YDS. OF 100% COTTON	1000	YDS.	1.00	1000.00
5. 1000 YDS. OF 100% COTTON	1000	YDS.	1.00	1000.00
6. 1000 YDS. OF 100% COTTON	1000	YDS.	1.00	1000.00

**SERVO MECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
PROJECT NO. 6345**

TERMINAL STRIP ASS'Y

DB. BM-G 8-23-47

A-30823

SCALE: 1 : 1

CK. R. H. M.	APP.
--------------	------

10/21/07

DATE _____

APP.

1

1

--	--

A-308'3

FILED IN A-51
B-30823

 $\frac{1}{4}$

WATERBURY - NEW BEDFORD

SERVO MECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 10-1-50

THE NATIONAL ARCHIVES

SCALE: 1 1 1

DR. J. H. Mc

ENG.

Ск. Р. 12/12

APP.

A-30813

WO-

TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL + .005 FRACTIONAL $\pm \frac{1}{64}$

UNION AVE B-31021

DRILL AND TAP FOR 6-32 SCREW

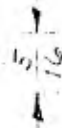
[illegible]

WO-

TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL $\pm .005$ FRACTIONAL $\pm \frac{1}{64}$

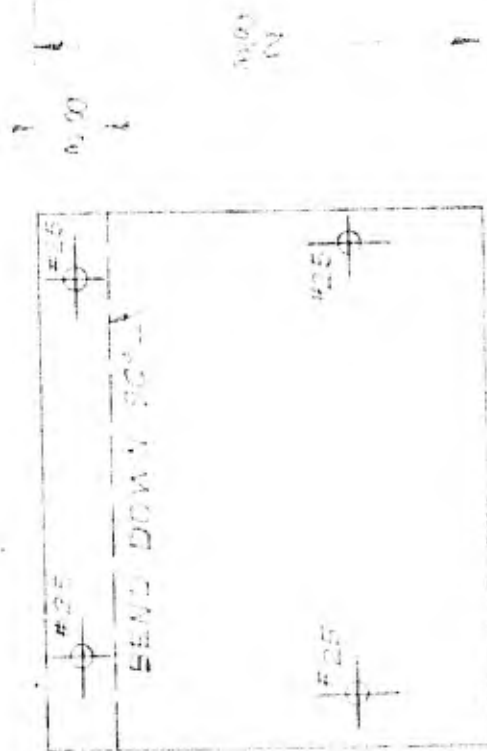
B-31021

---#15 (.130) DRILL

[illegible]

A-30817

REVISION B-31021



MATERIAL 1/8 ALUMINUM

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

MOUNTING BRACKET FOR VARIABLE FREQUENCY
CLOCK-PULSE GEN.

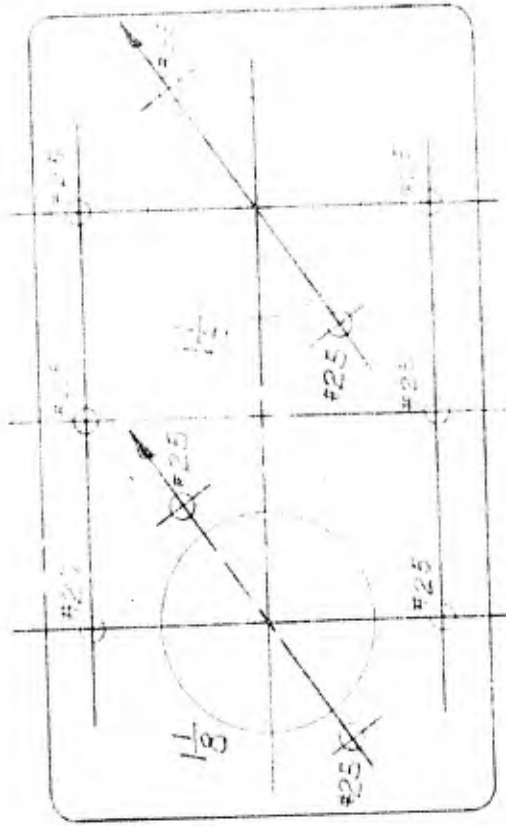
SCALE: 1:1 DR. R.M.P. & R.47

ENG. *HK* CK. R.M. APP.

A-30817

A-30818

INDEX AND B-31021



MATERIAL ALUMINUM

SEISMO MECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6375

COLL. INT. FLAME FREQ. FIVE VARIABLE FREQUENCY
FLAME GEN.

SCALE: 1" = 1" DR. F. 3-3-47

ENG. APP. 13/14/47

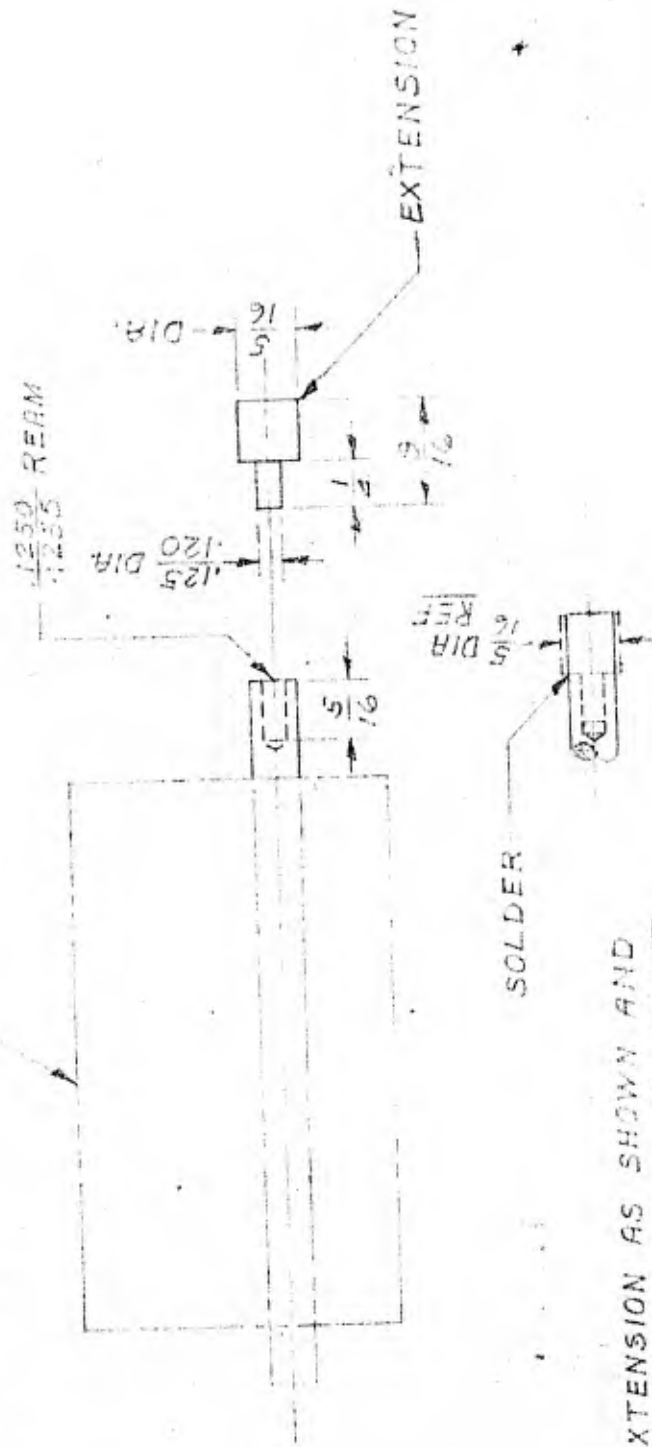
A-30818

WO-

TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL + .005 FRACTIONAL $\pm \frac{1}{64}$

B-31021

CAPACITOR. (HAMMERLUND MC-250-M)



MAKE EXTENSION AS SHOWN AND
TURN DOWN TO CAPACITOR SHAFT
DIA. AFTER SOLDERING AS INDICATED

[illegible]

TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL $\pm .005$ FRACTIONAL $\pm \frac{1}{64}$

QTY	MATERIAL - DESCRIPTION	PART NO.	QUAN.
2	LUG	#2300	1
8	LOCKWASHER ~ SHAKEPROOF #4	1704	2
7	LOCKWASHER ~ SHAKEPROOF #6	1706	1
6	RD. HD SCREW #4-40 x $\frac{1}{2}$ LG.		2
5	BINDER HD. SCR. #6-32 x $\frac{1}{2}$ LG.		1
4	SHIELD CAN BOTTOM	A30811	1
3	MOUNTING PLATE	A30748	1
2	NAMEPLATE ASS'Y (HIGH FREQ.)	A30843	1
1	COIL WINDING ASS'Y (HIGH FREQ.)	B30824	1

**SERVO MECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. C-345**

HIGH. FREQ. COIL ASS'Y

SCALE: FULL	DR. P. Kelley	9/4/47
TR. HIC	CK. R. H. H. H.	9/10/47
	APP.	

A-30846-1

B-30824-1

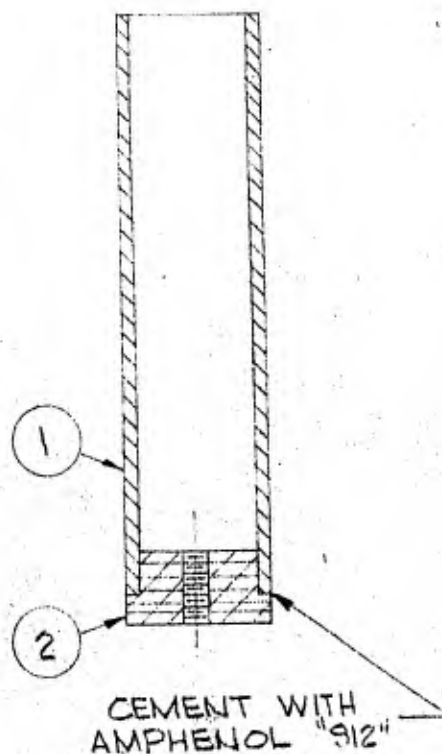
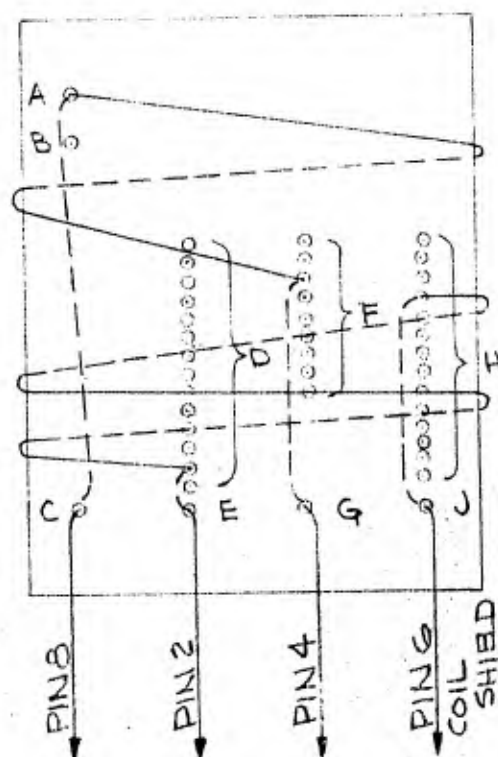
TOLERANCES NOT OTHERWISE SPECIFIED:

WO-

DECIMAL $\pm .005$

FRACTIONAL $\pm \frac{1}{64}$

USED IN ASSY - A 30750



COIL DEVELOPMENT #A-30750

P					G
N					F
M					E
L					D
K					C
J					B
H					A
	WAS	APP.	DATE		

HIGH FREQUENCY COIL INSTRUCTIONS

Use #20 formex magnet wire

- (1) Plate Winding: Feed wire in through hole A and draw down inside of tube and out hole C leaving a 4" lead. Start winding from hole A and wind a single layer close wound coil of 35 turns ending last turn by feeding wire in through nearest hole of group F draw wire down inside of tube and out through hole G leaving a 4" lead.
- (2) Feed Back Winding: Feed wire in through a hole in group H so that there is 1/8" spacing between the Plate winding and the feedback winding. Draw the wire down inside of tube and out hole J leaving 4" lead. Wind on a single layer close wound coil of 17 turns making sure that 1/8" spacing has been left between plate winding and feed back winding. End last turn by feeding through nearest hole in group D draw down inside of tube and out hole E leaving 4" lead.
- (3) Cement windings with Amphenol 912 coil dope.
- (4) Cement coil mounting plug (A-30749) in place with Amphenol 912 coil dope.
- (5) Let coil dry for at least an hour.

				2		MOUNTING PLUG		A30749		1	
				1		OSCILLATOR COIL FORM.		A30750		1	
				ITEM		MATERIAL - DESCRIPTION				PART NO. QUAN.	
			G			SERVOMECHANISMS LABORATORY OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345 COIL WINDING ASS'Y (HIGH FREQ.)					
			F								
			E								
			D								
			C								
			B								
			A			SCALE: Full		DR. R. Kelly 8/20/47		B-30824-1	
APP.	DATE		WAS	APP.	DATE	TR. <i>[Signature]</i>		CK. <i>[Signature]</i> 9/10/47			

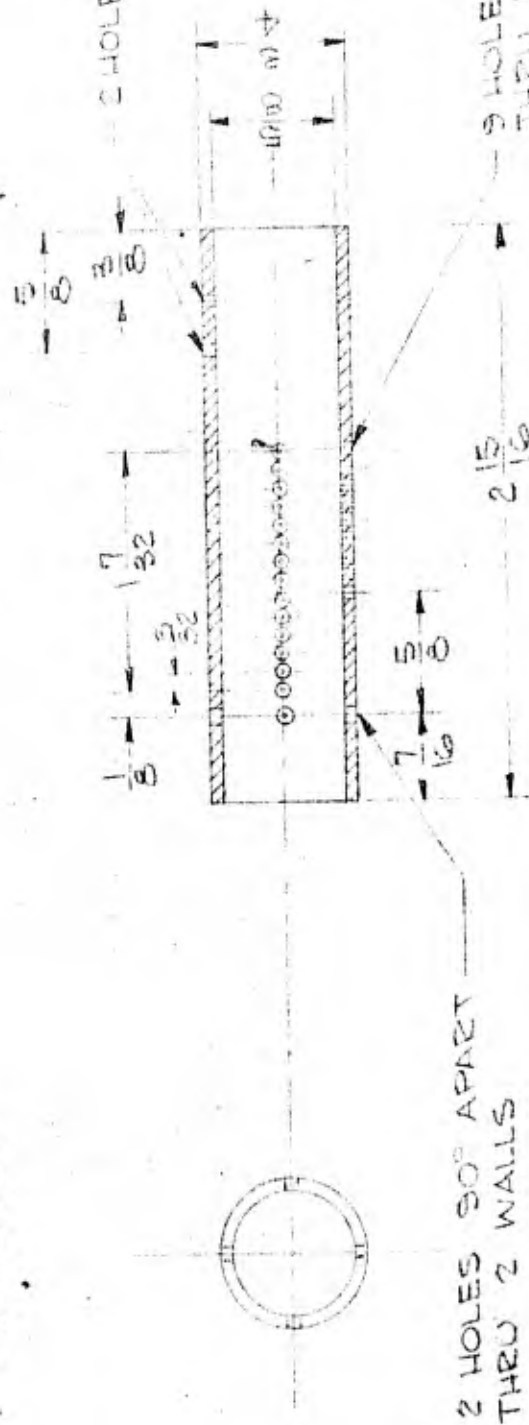
WO-

FRACTIONAL $\pm \frac{1}{64}$

USED IN ASSY - B 30824

USED IN ASSY - B 30825

USGPN ASSTY - B30826



NOTE:-
ALL HOLES ARE #55 DRILL (.052)

P																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																</
---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----

W/O-

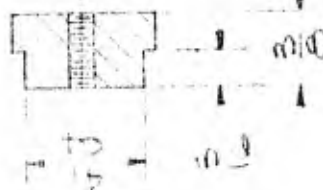
TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL $\pm .005$ FRACTIONAL $\pm \frac{1}{64}$

USED IN ASSY - B30824

USED IN ASSY - B 30825

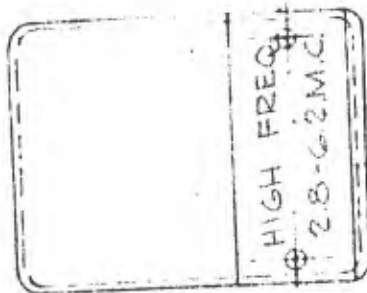
USED IN ASSY - B30826

#100 DRILL (100)

[illegible]

A-3083
 WO-
 TOLERANCES NOT OTHERWISE SPECIFIED:
 DECIMAL $\pm .005$ FRACTIONAL $\pm \frac{1}{16}$

USED IN ASSY A-30846



ITEM	MATERIAL - DESCRIPTION	PART NO.	QUAN.
3	DRIVE SCREW - PARKER-KALON	A30827C	1
2	SHIELD NAMEPLATE	A30810	1
1	SHIELD CAN		

SERVOMECHANISMS LABORATORY OF THE
 MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

NAMEPLATE ASS'Y (HIGH FREQ)

SCALE: FULL DR. R. K. L. 8/25/47

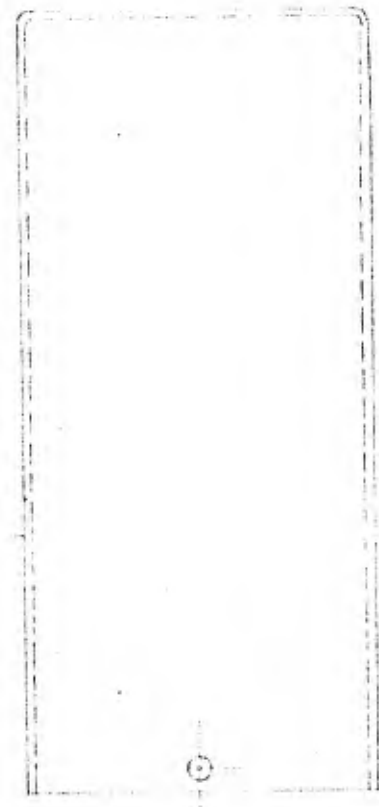
TR. 107C CR. R. K. L. 9/10/47 APP.

A-30843

P																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

A-30810
 WO-
 TOLERANCES NOT OTHERWISE SPECIFIED:
 DECIMAL ± .005 FRACTIONAL ± 1/64

USED IN ASSY - A30841
 USED IN ASSY - A30842
 USED IN ASSY - A30843



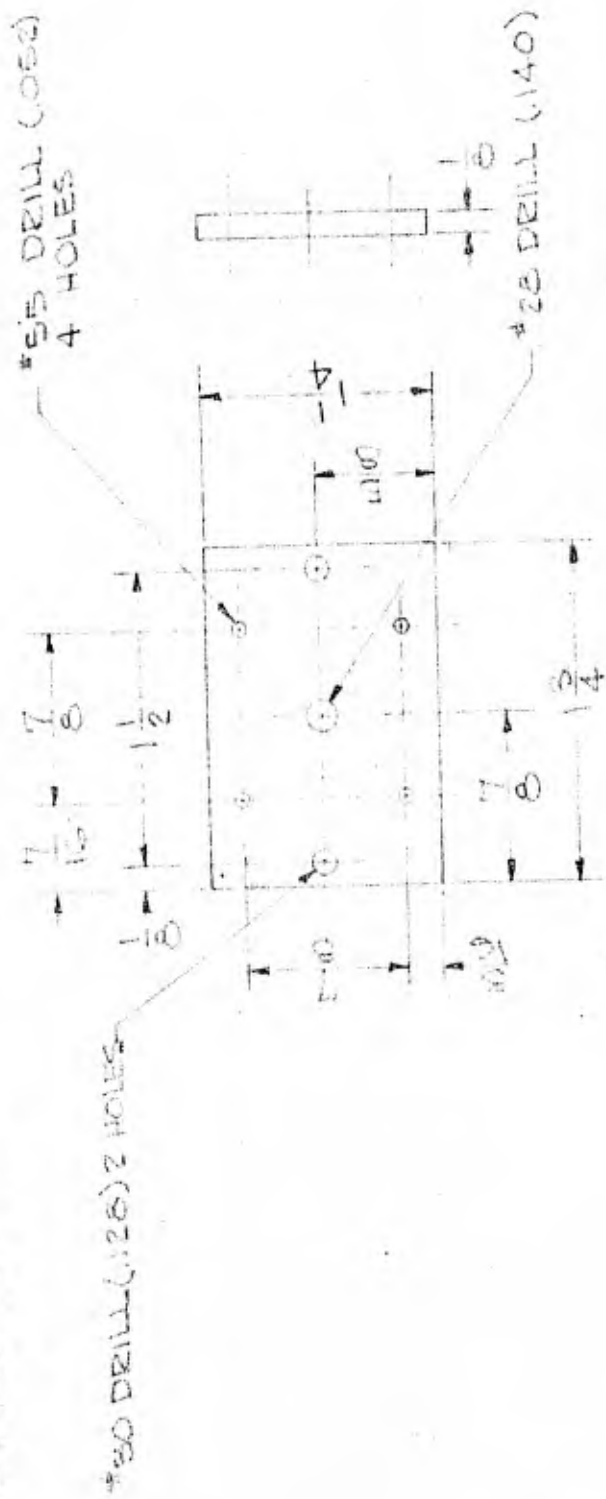
USE DRILL (.050)
 2 HOLES

1
 10
 1
 16

P	N	M	L	K	J	H	WAS	APP.	DATE	G	F	E	D	C	B	A	WAS	APP.	DATE
ALTER SHIELD CAN J. MILLEN CO. 74400																			
ITEM MATERIAL - DESCRIPTION PART NO. QUAN.																			
SERVOMECHANISMS LABORATORY OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345																			
SHIELD CAN																			
SCALE: FULL										DR. Kelley 8/20/47									
TR. 141C										CK. RBM 9/10/47 APP.									
A-30810																			

A-30748
 WO-
 TOLERANCES NOT OTHERWISE SPECIFIED:
 DECIMAL ± .005 FRACTIONAL ± 1/16

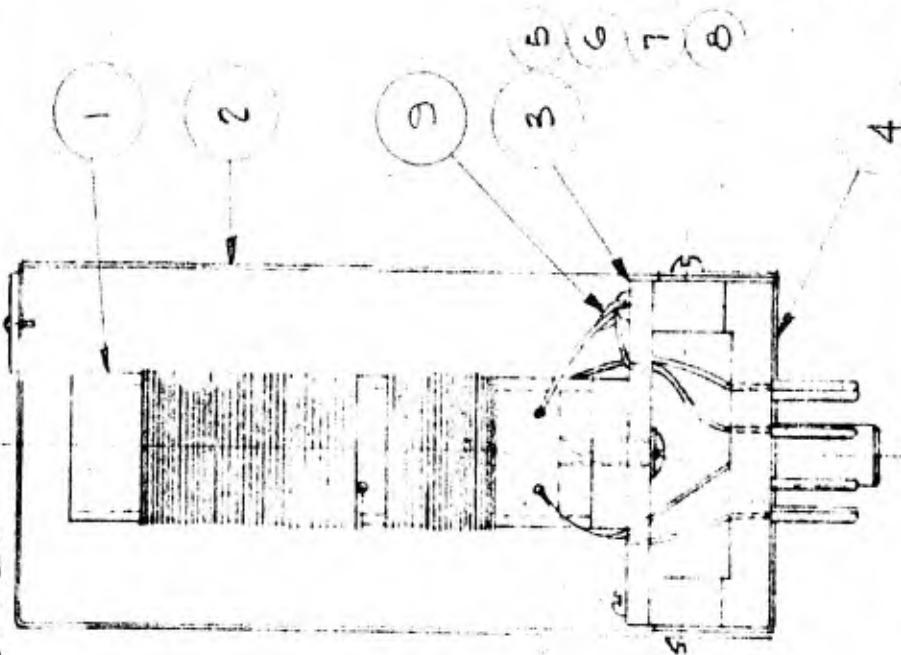
USED IN ASSY - A 30844
 USED IN ASSY - A 30845
 USED IN ASSY - A 30846



WO-

TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL $\pm .005$ FRACTIONAL $\pm \frac{1}{16}$

B-31021



ITEM	MATERIAL - DESCRIPTION	PART NO.	QUAN.
5	LUG	#2300	1
8	LOCKWASHER - SHAKEPROOF #4	1704	2
7	LOCK WASHER - SHAKEPROOF #6	1706	1
6	RD. HD SCREW #4-40 x $\frac{1}{4}$ LG.		2
5	BINDER HD. SCR. #6-32 x $\frac{1}{2}$ LG.		1
4	SHIELD CAN BOTTOM	A30211	1
3	MOUNTING PLATE	A30745	1
2	NAMEPLATE ASS'Y (MED. FREQ)	A30842	1
1	COIL WINDING ASS'Y (MED. FREQ)	B50825	1

SERVO MECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 63-5

MED. FREQ. COIL ASS'Y

SCALE: FULL	DR. E. Kelley 9/3/47
-------------	----------------------

TR.	CK.	APP.
1	2	3

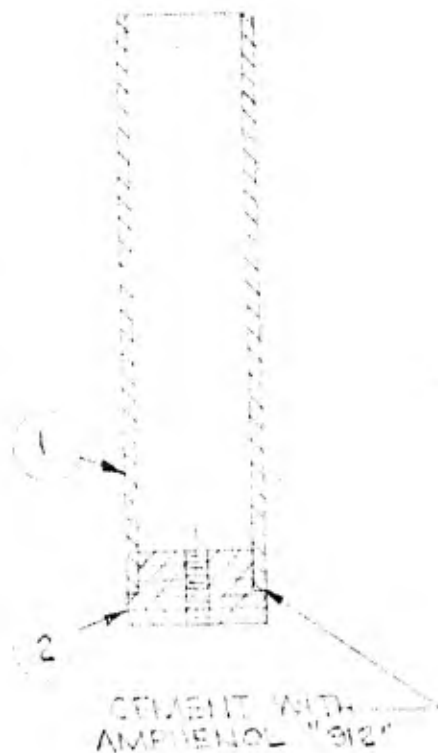
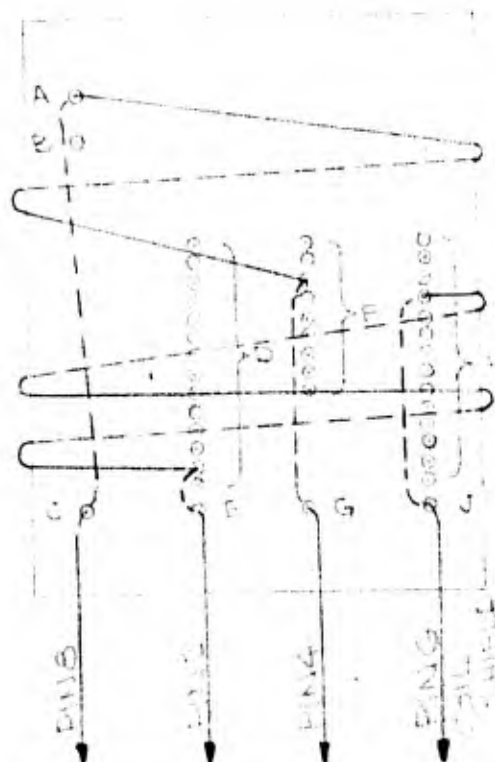
A-30845-1

B- 30825-1

WO.

TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL $\pm .003$ FRACTIONAL $\pm \frac{1}{64}$

USED IN ASSY A - 30945



COIL DEVELOPMENT "A-30750"

P			
N			
M			
L			
K			
J			
H			
	WAS	APP	DATE

MEDIUM FREQUENCY COIL INSTRUCTIONS

Use #24 formex magnet wire

- (1) Plate Winding: Feed wire in through hole A and draw down inside of tube and out hole G leaving a 4" lead. Start winding from hole A and wind a single layer close wound coil of 60 turns ending last turn by feeding wire in through nearest hole of group F draw wire down inside of tube and out through hole G leaving a 4" lead.
- (2) Feed Back Winding: Feed wire in through a hole in group H so that there is 1/8" spacing between the Plate winding and the feedback winding. Draw the wire down inside of tube and out hole J leaving 4" lead. Wind on a single layer close wound coil of 30 turns making sure that 1/8" spacing has been left between Plate winding and feed back winding. End last turn by feeding through nearest hole in group D draw down inside of tube and out hole E leaving 4" lead.
- (3) Cement windings with Amphenol 912 coil dope.
- (4) Cement coil mounting plug (A-30749) in place with Amphenol 912 coil dope.
- (5) Let coil dry for at least an hour.

2	MOUNTING PLUG	A30143	1
1	OSCILLATOR COIL FORM	A30750	1
ITEM	MATERIAL - DESCRIPTION		PART NO. QUAN.
SERVOMECHANISMS LABORATORY OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6240			
COIL WINDING ASSEMBLY (VAR. 1452)			
SCALE 1:1		DRAWN BY 2/2/47	
TH 12/1	CH 12/1	APP 12/1	
DATE 9/10/47		B-30825-1	

W.O.

TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL ± .008 FRACTIONAL ± 1/64

PROPERTY A-30845

MED. FREQ.
1.8-3.9 M.C.

1.8-2.5 M.C.

၁၆

2

၁၆

1	DRIVE SCREW - PARKER-KALON	400	2
2	SHIELD NAMEPLATE	A30827B	1
1	SHIELD CAN	A30810	1
ITEM	MATERIAL - DESCRIPTION	PART NO.	QUAN.
SERVOMECHANISMS LABORATORY OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6845			
NAMEPLATE ASS'Y (MED.FREQ)			
SCALE: FULL	DR. <i>R. Kelly</i>	8/25/47	
TR. <i>H. V.</i>	CK. <i>R. Kelly</i>	APP.	DATE <i>9/10/47</i>
P	G		
N	F		
M	E		
L	D		
K	C		
J	B		
H	A		
		WAS	DATE
		APP.	DATE
		WAS	DATE

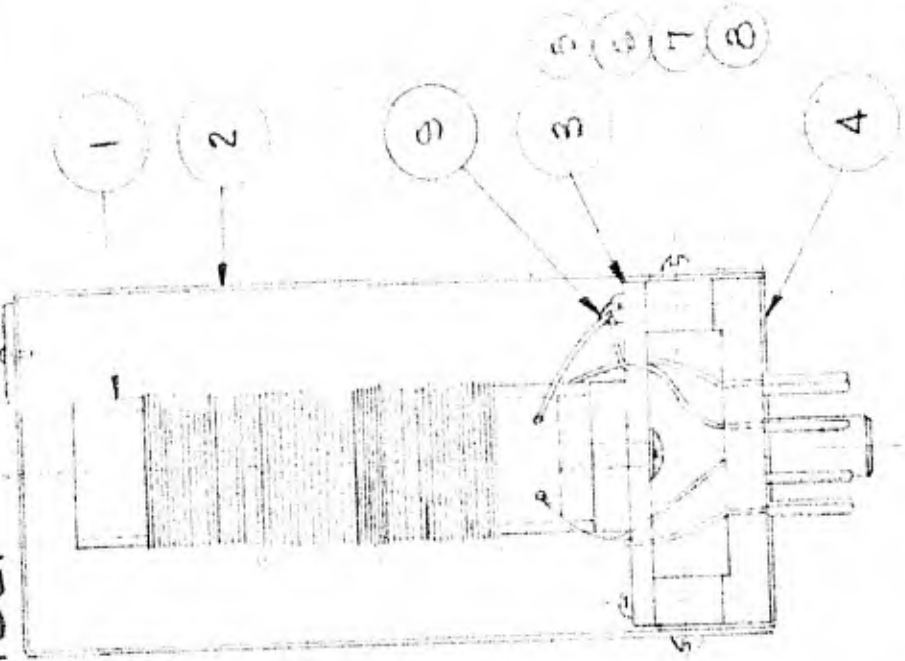
—ALBANY— TEL. 426-5231 EXT. 3-7-11

A-30844-1

WO.

TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL $\pm .005$ FRACTIONAL $\pm \frac{1}{16}$

COIL WINDING ASSY B-31021



ITEM	MATERIAL - DESCRIPTION	PART NO.	QUAN.
9	LUG	2200	1
8	LOCKWASHER - SHAKESPROOF #4	1704	2
7	LOCKWASHER - SHAKESPROOF #6	1706	1
6	RD. HD. SCREW #4-40 x $\frac{1}{4}$ LG		2
5	BINDER HD. SCR. #6-32 x $\frac{1}{2}$ LG		1
4	SHIELD CAN BOTTOM	A30811	1
3	MOUNTING PLATE	A30748	1
2	NAMEPLATE ASSY (LOW FREQ)	A30841	1
1	COIL WINDING ASSY (LOW FREQ)	B30829	1

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

LOW FREQ. COIL ASSY

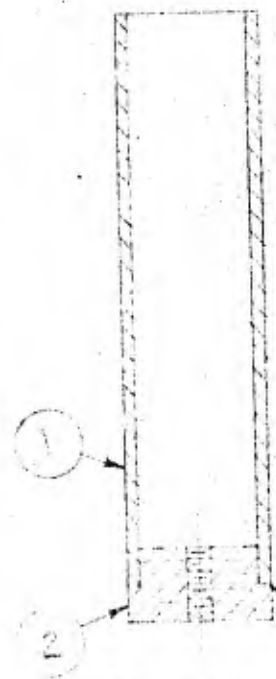
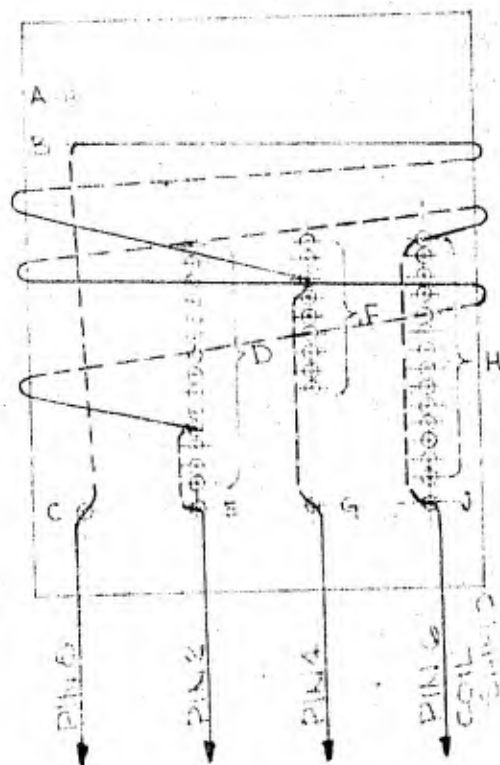
SCALE: FULL	DR. REVIEWED 9/3/47	APP.
TR 1/2	CK. R.H.M. 2/10/47	

WAS	APP.	DATE	WAS	APP.	DATE

A-30844-1

WO-

USED IN ASSY A-30844



CEMENT WITH -
AMPHENOL 7012

COIL DEVELOPMENT *A-30750

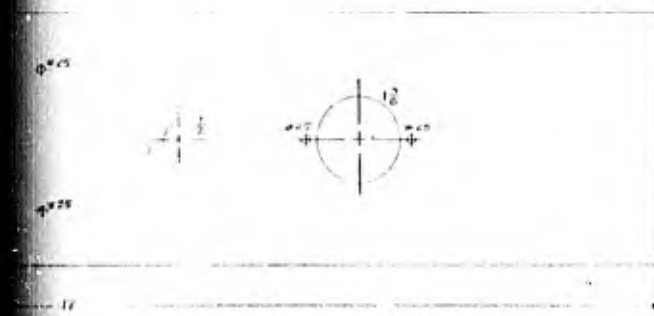
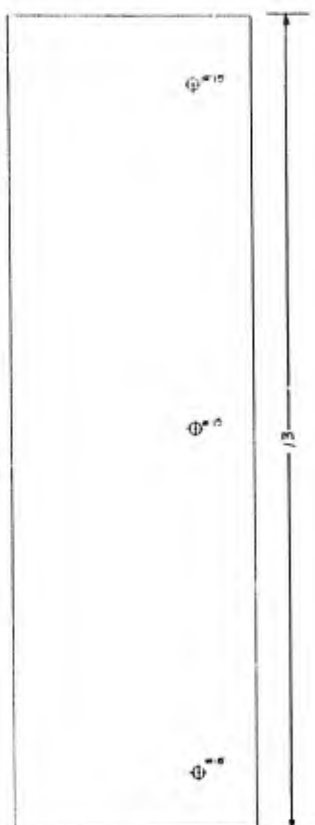
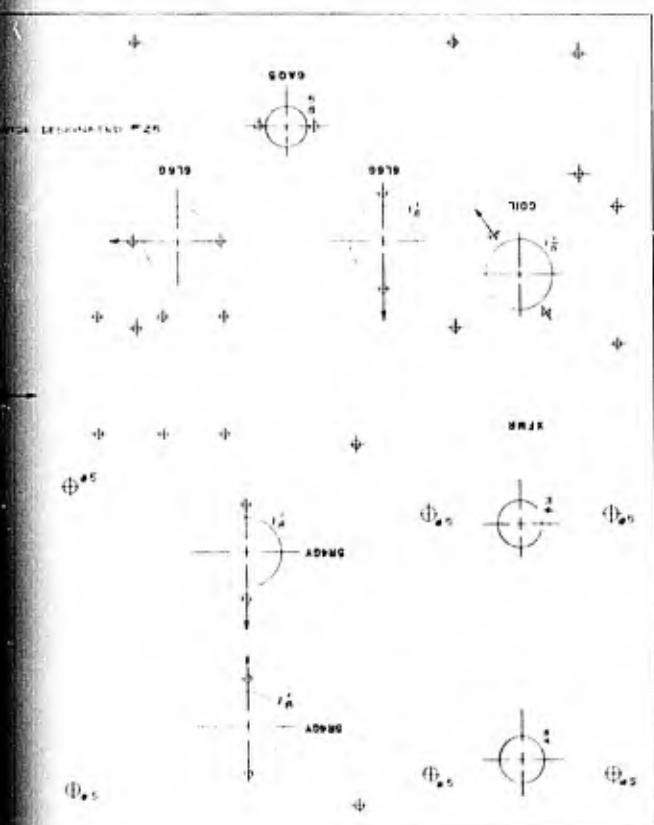
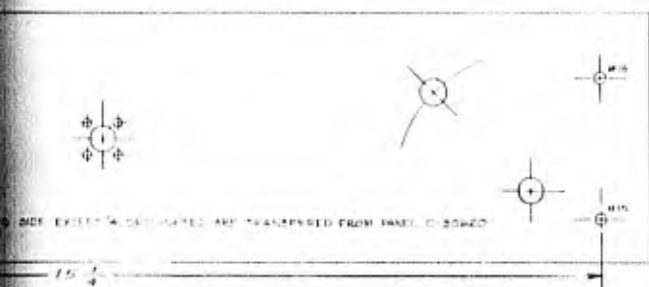
P			
N			
M			
L			
K			
J			
H			
	WAS	APP	DATE

LOW FREQUENCY COIL INSTRUCTIONS:

Use #32 formex magnet wire.

- (1) Plate Winding Feed wire in through hole B. draw down inside of tube and out hole C., leaving a 4" lead. Winding of coil is now started from hole B. Wind on a single layer close wound coil of 110 turns ending the last turn by feeding wire through the nearest hole in group F. Draw the wire down inside of tube & out hole G. leaving a 4" lead
- (2) Wind two turns of .001" polystyrene tape over the lower end of the winding just completed, letting the tape cover $3/8$ " of the winding.
- (3) Feed Back Winding: Feed wire through hole in group H nearest the plate winding and draw down inside tube and out hole J leaving a 4" lead. Winding is now started from hole H by laying wire up onto the lower end of the plate winding $1/8$ " and winding back over the lead so that $1/8$ " of the feed back winding overlaps the plate winding. The winding is now continued to make a total of 50 turns (all turns close wound) and ended by feeding through the nearest hole in group D, drawing down inside tube and out hole E, leaving 4" lead.
- (4) Cement coil with Amphenol 912 coil dope.
- (5) Cement coil mounting plug (A-30749) in place with Amphenol 912 coil dope.
- (6) Let coil dope dry for at least an hour.

			G					2	MOUNTING PLUG	A30748	1
			F					1	OSCILLATOR COIL FORM	A30749	1
			E					ITEM	MATERIAL - DESCRIPTION	PART NO.	QUAN.
			D					SERVOMECHANISMS LABORATORY OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 374C			
			C					COIL WINDING ASSEMBLY (LOW FREQ)			
			B					SCALE	FOOT	DR	4/10/51
			A					TR	CK	APP.	B-30826-1
PP	DATE			WAS	APP	DATE		1/10	9/10/51		



REVISIONS		DATE	BY
1	REVISION	10/1/68	W-1
CHECKED BY: DESIGNED BY: DRAWN BY: TITLE: PROJECT: E-30618-2			

2

C-30620-2
WO.

TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL ± .005 FRACTIONAL ± 1/16

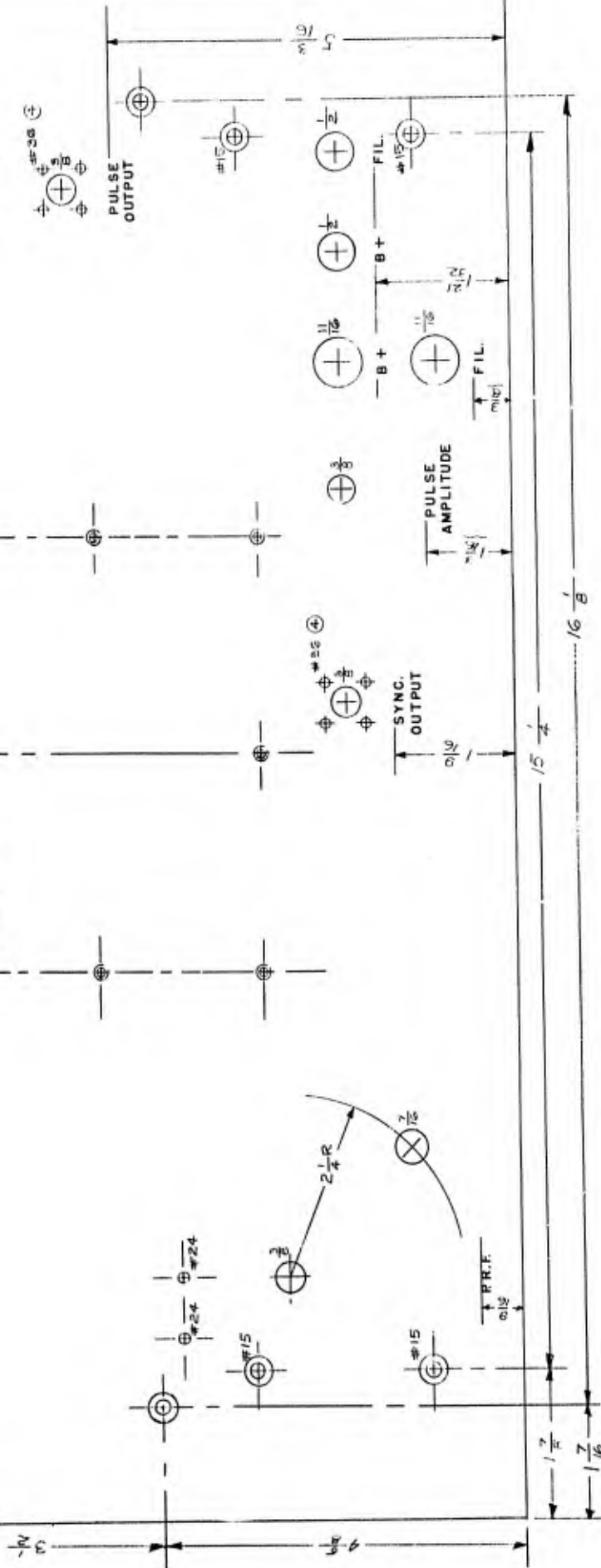
USED IN ASSEMBLY B-31021

VARIABLE FREQUENCY CLOCK - PULSE GENERATOR

G-30607-1

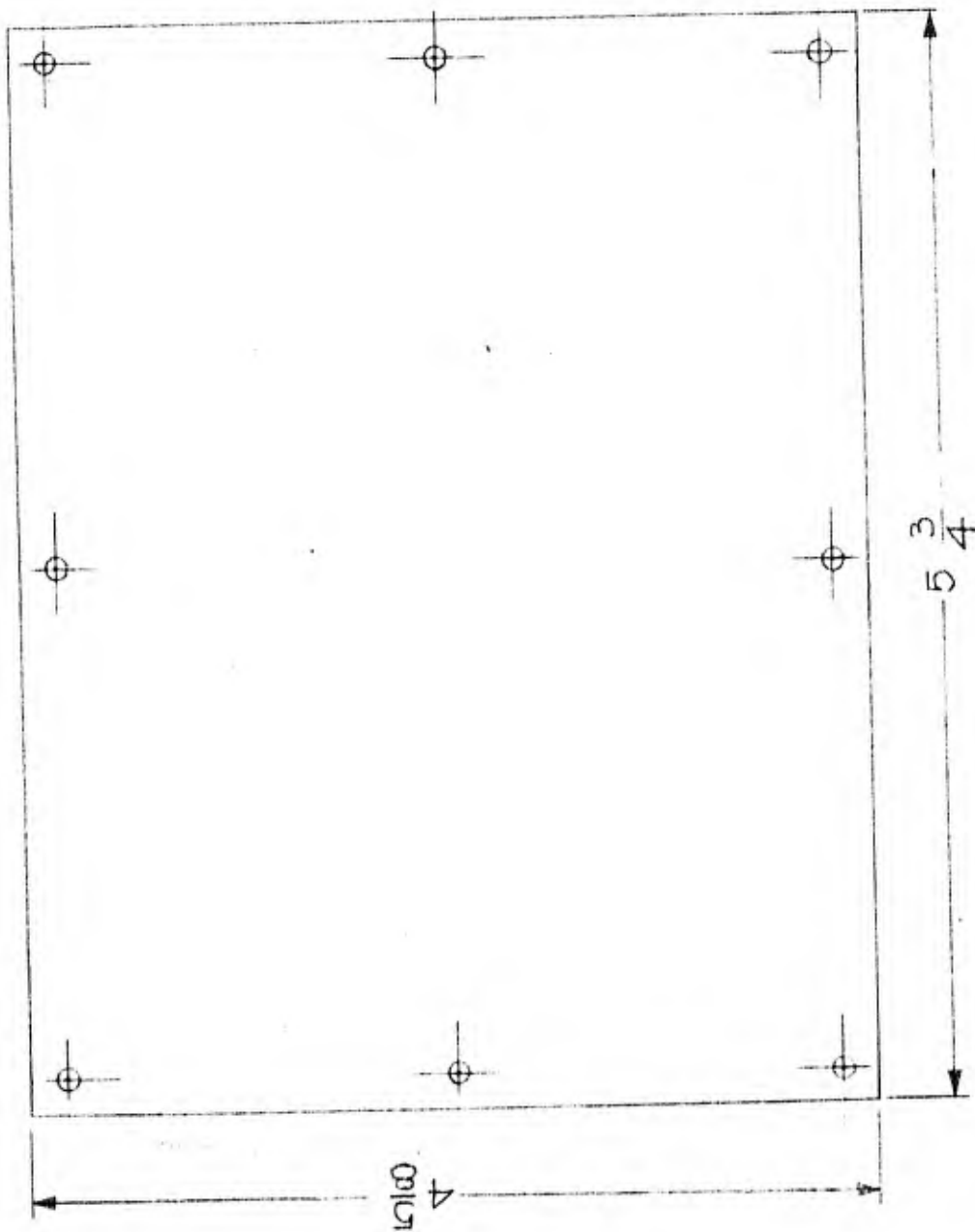
4 HOLES, #15 DRILL
C/SK TO 3/16 DIA.

#42(.009)DS
4-40 NE-2 1/4 P
8 HOLES



A-31090

USED IN A-31090 B-31021



MATERIAL - $\frac{1}{8}$ THICK, PLEXIGLASS
(ROHM AND HAAS CO.)

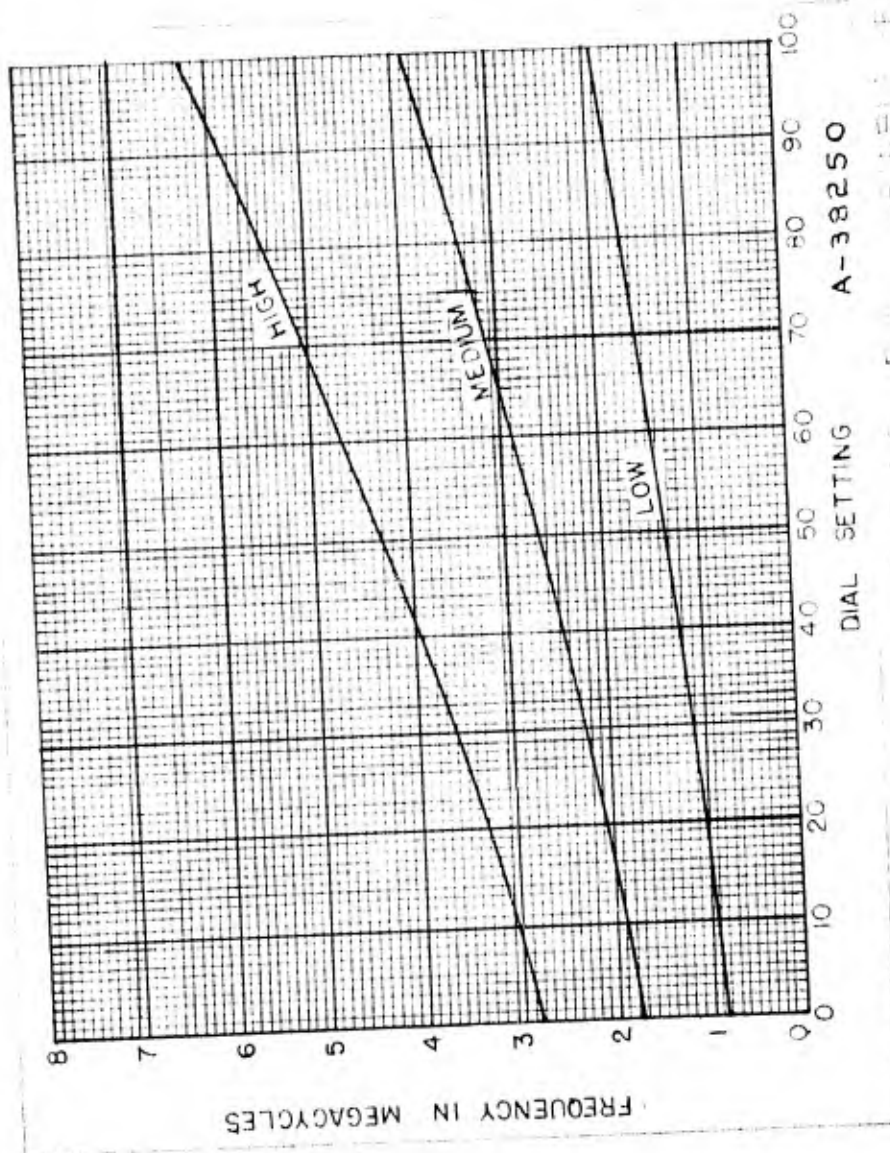
SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

CHART FACING

SCALE: FULL DR RVW 10/14/47

ENC 1415 CK. R. H. M. APP. 10/13/47

A-31090



FREQUENCY CALIBRATION CURVE FOR A-38250
CLOCK-PULSE GENERATOR. DIAL SETTING

6345

D.L.O. 7-4-47

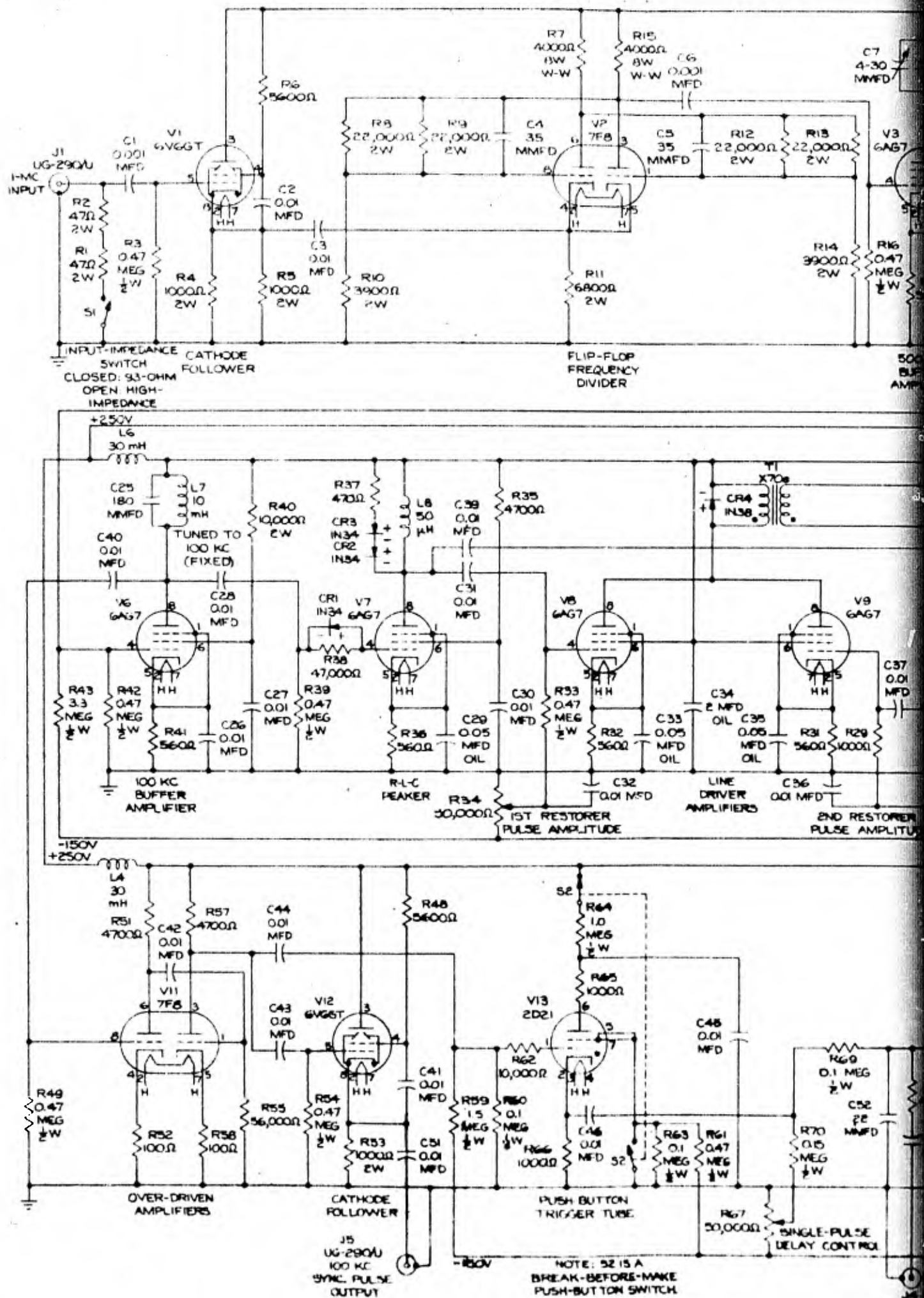
A-38250-G

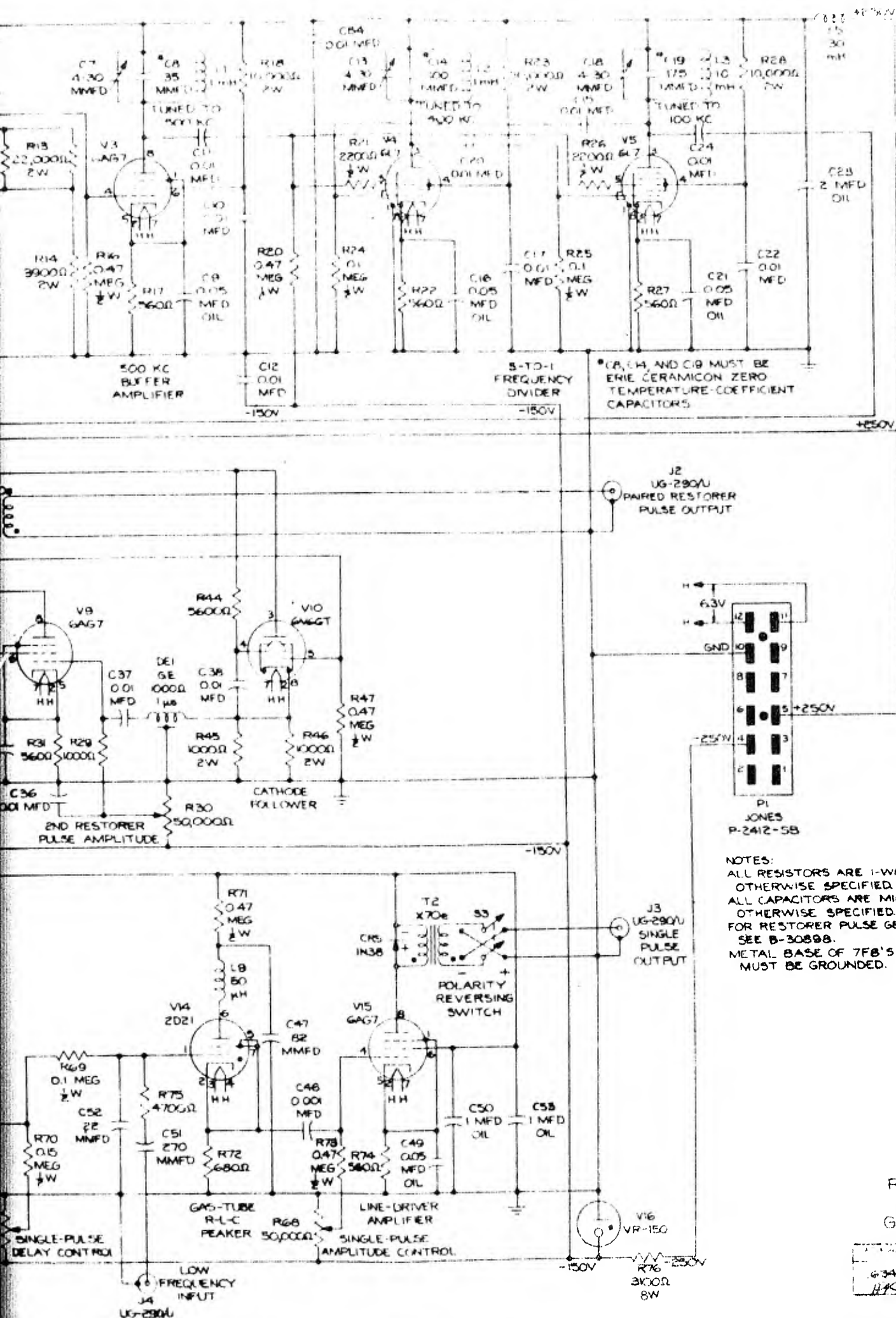
TEST EQUIPMENT DRAWING LIST

Restorer Pulse Generator, Vol. 19, E-52

D-30770	A-30779
B-30784	A-30785
A-30777	A-30778
A-30776	A-30789
A-30791	A-30782
B-30788	A-30790
A-30781	A-30783
B-30787	E-30774
A-30780	C-30775
B-30786	B-30898

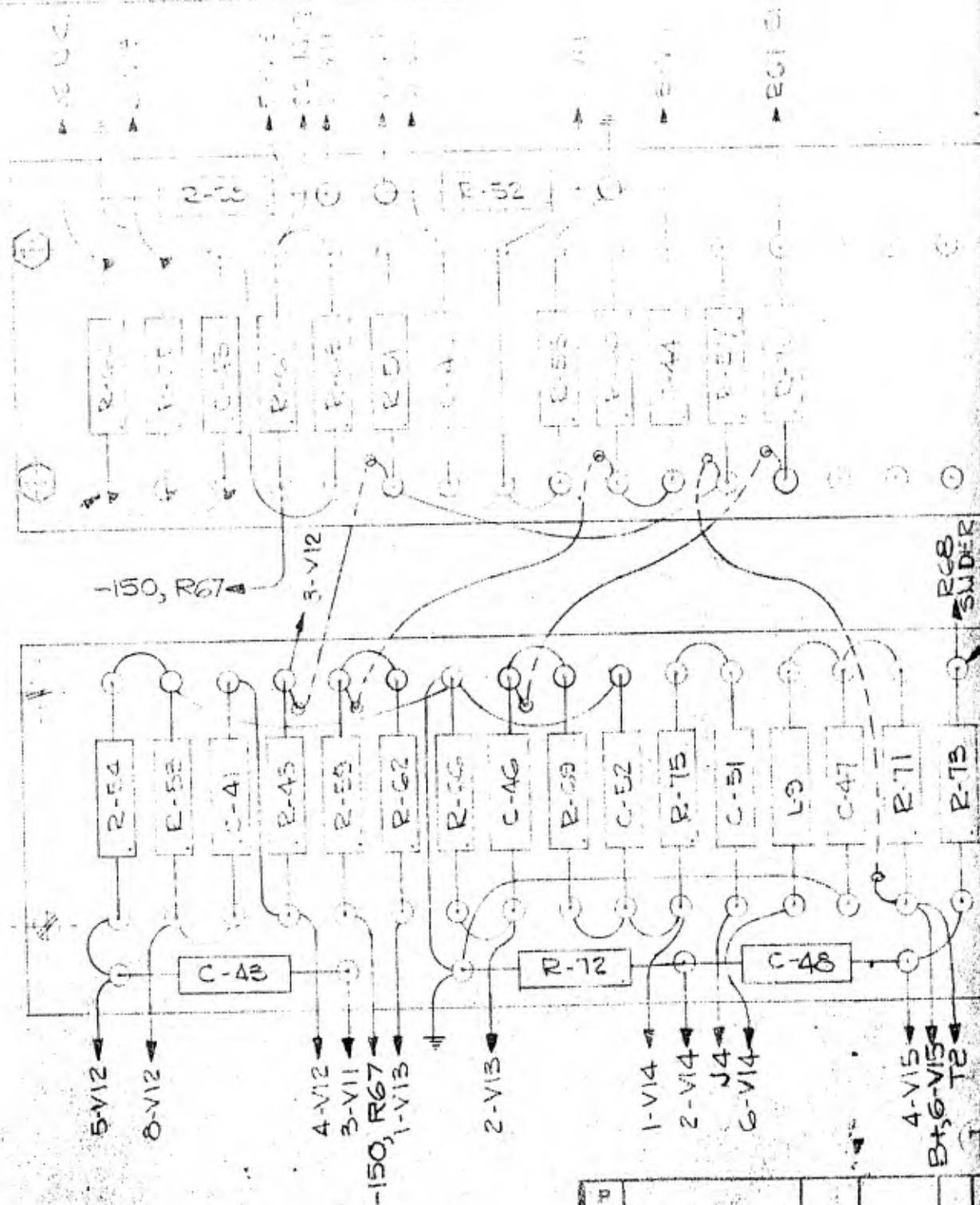
D-30770-1





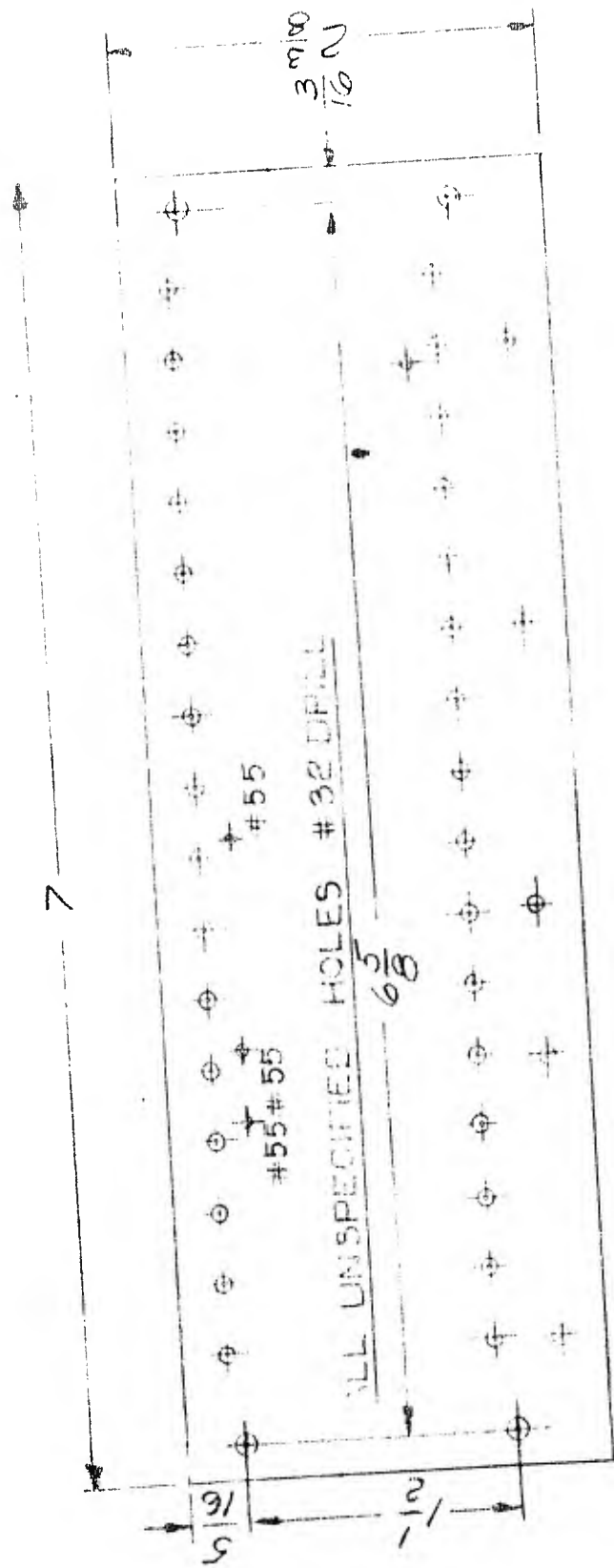
MgCl_2 TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMALS .005 FRACTIONAL 1/16

100-100000
B-20809



P				
N				
M				
L				
K				
J				
H				
	WAS	APP	DATE	

A-30777-3
 USED IN ASSY B-30784



1. LIVEN BLENDE

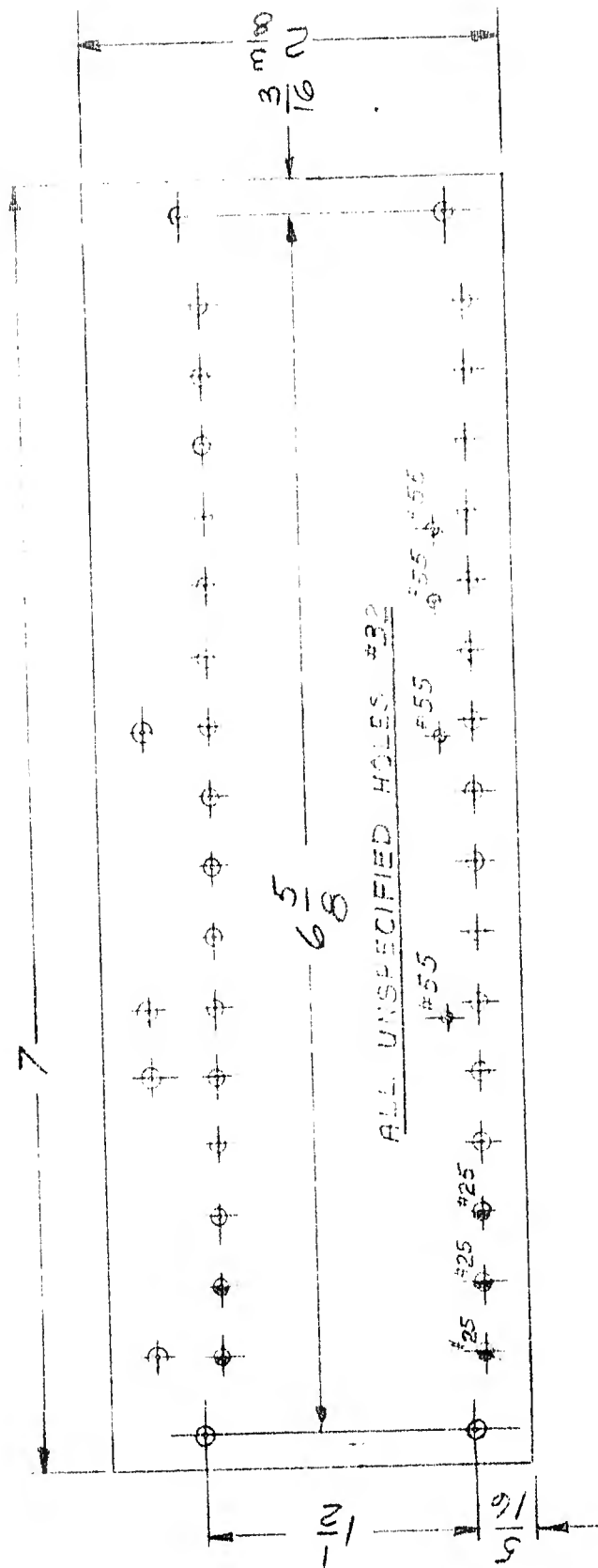
CTD 11147

A-30777-3

2345

100 R6m H.K.

100-30784



001-100
FEB 17 1977
KELT

91

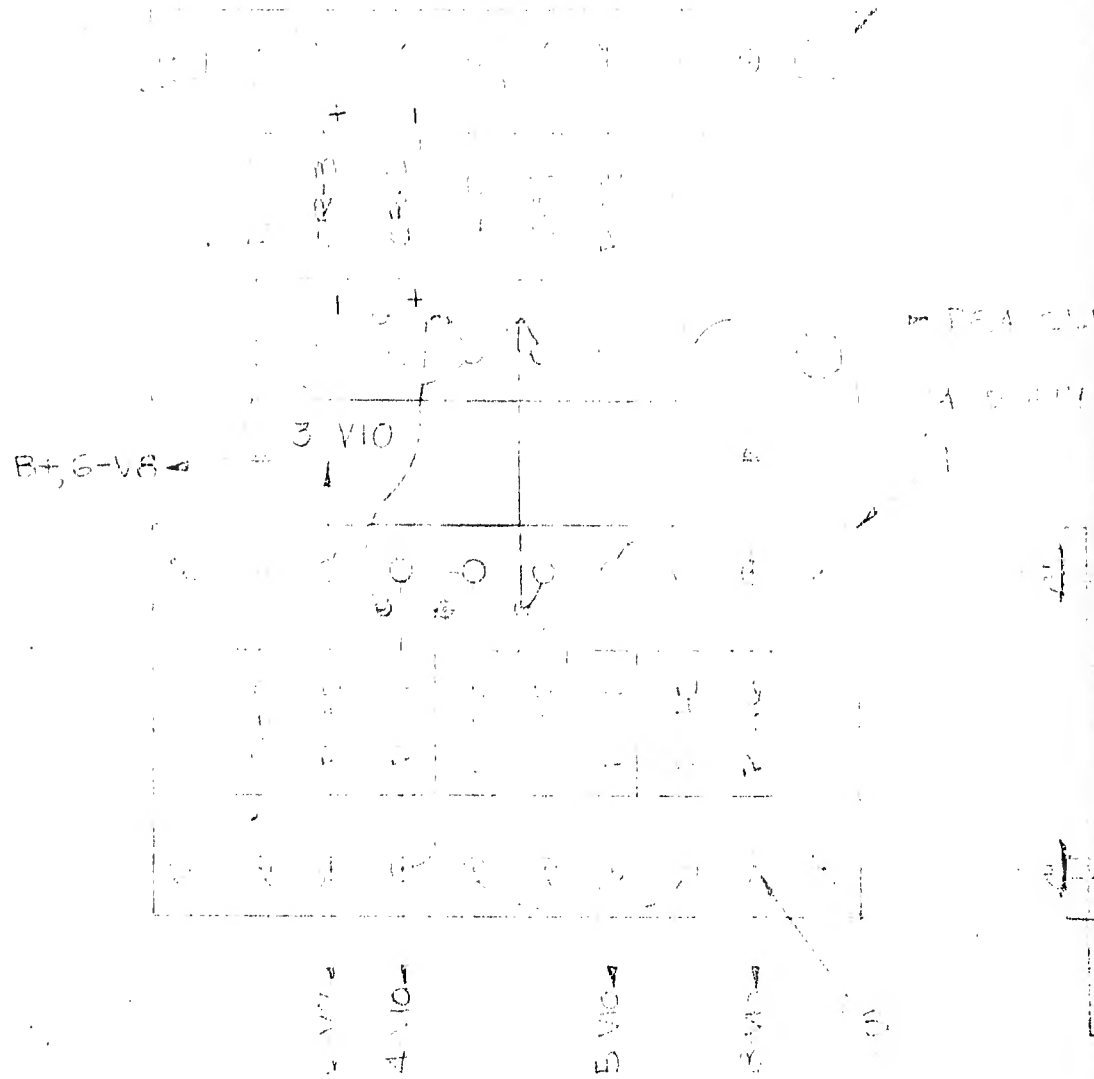
A 30719 (1)

()

THESE PAGES HAVE BEEN DECLASSIFIED BY THE
NATIONAL ARCHIVES ON 08-11-2013

[illegible]

The diagram illustrates a two-stage gas turbine engine. It consists of a compressor (1) driven by a turbine (2) through a shaft. The compressor outlet (3) is connected to a combustor (4) where fuel is injected. The combustion products expand through a turbine (5) which drives the compressor. The exhaust (6) is shown at the end of the engine.



ELECTRICAL PARTS LISTS							
SERIAL NO.	VALUE	SERIAL NO.	VALUE	P			
R 33	0.47MEG $\frac{1}{2}$ W	C 31	0.01 MFD, MICA	N			
R 35	4700 Ω 1W	C 32	0.01 MFD, MICA	M			
R 37	470 Ω 1W	C 38	0.01 MFD, MICA	L			
R 44	5600 Ω 1W	C 39	0.01 MFD, MICA	K			
R 45,R 46	1000 Ω 2W	L 8	50 μ H	J			
R 47	0.47MEG $\frac{1}{2}$ W	CR2, CR3	IN3-4	H			
C 30	0.01 MFD, MICA				WAS	APP.	DATE

7	HEX NUT #4-40		2
6	LOCKWASHER - 1/2" LINK #4		4
5	LOCKWASHER - 1/2" LINK #4	1704	4
4	END NUT 3/8" 10 x 3/4" I.G.		4
3	TERMINAL LINK	1724 D	50
2	CONTINUOUS ROD	A30781	2
1	TERMINAL BOARD	A30781	2
ITEM	MATERIAL - DESCRIPTION	PART NO.	QUAN

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

TERMINAL BOARD ASSY

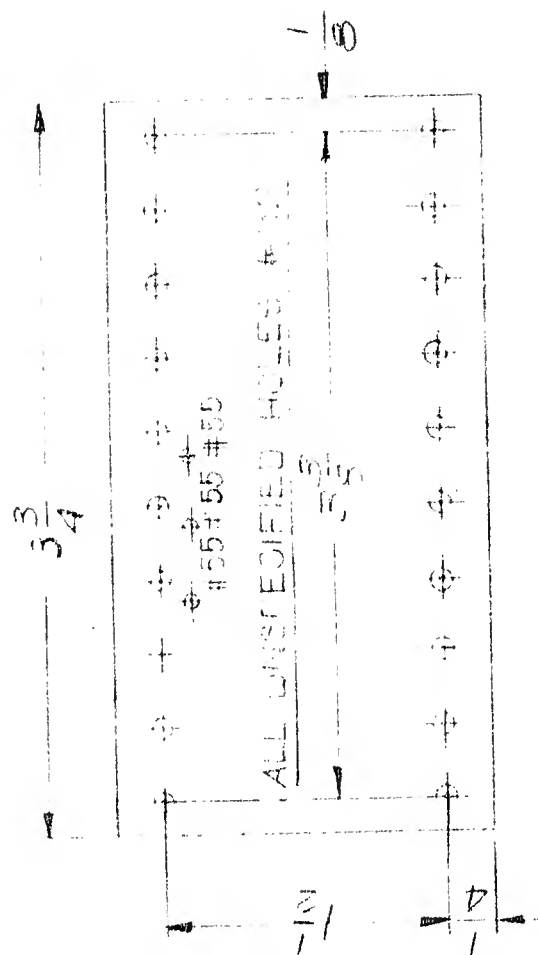
SCALE: Full DR. R. H. M. 3/14/47

TR. HK CK. R. H. M. 3/10/47 APP.

B-30788-2

DATE WAS APP. DATE

3
3
7
6
4
0



CONFIDENTIAL

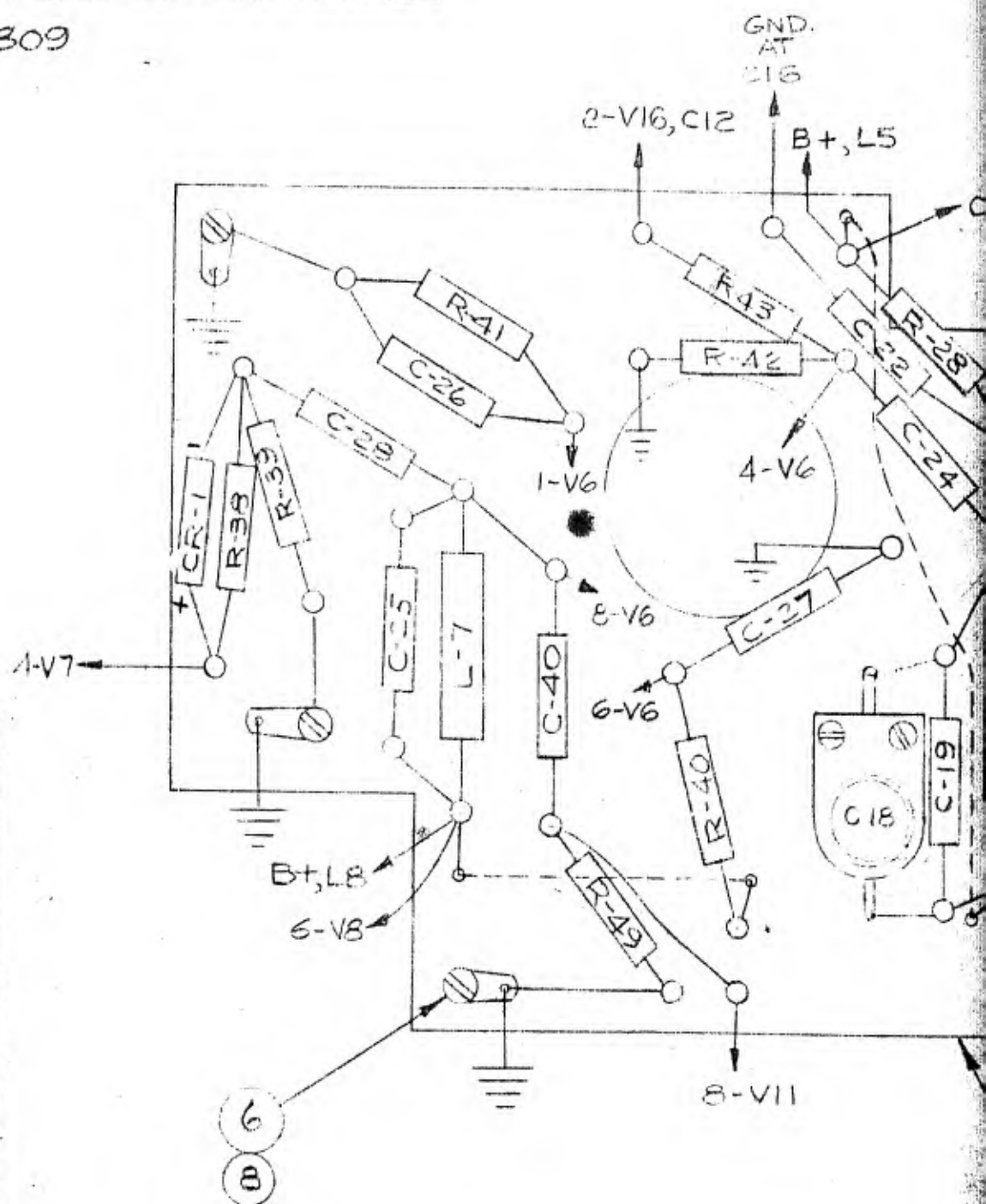
0-53117
6345
9876
HK

B-30787-5

WO-

TOLERANCES NOT OTHERWISE SPECIFIED
DECIMAL 1.00% FRACTIONAL 1/100%

USED IN ASST B-30809



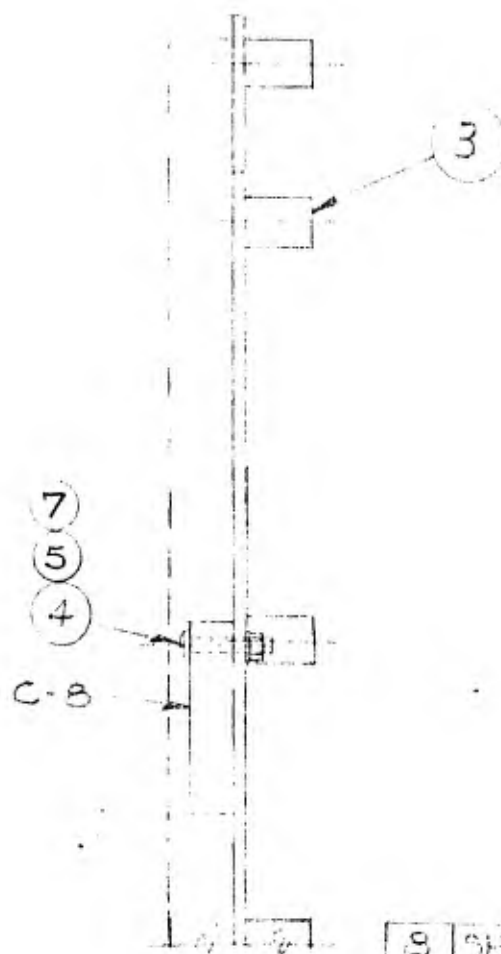
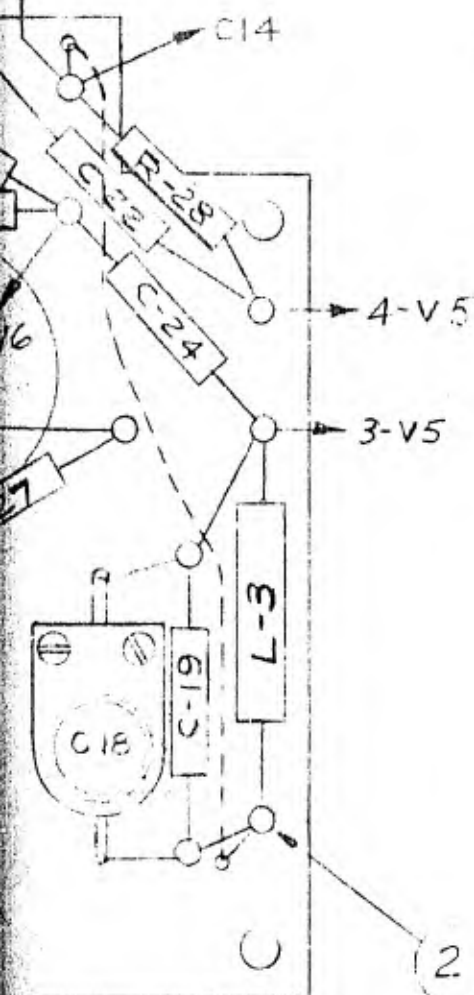
ELECTRICAL PARTS

SERIAL NO.	VALUE
R28	10,000 Ω , 2W
R38	47,000 Ω , 1W
R39	0.47 MEG. $\frac{1}{2}$ W.
R40	10,000 Ω , 2W
R41	560 Ω , 1W
R42	0.47 MEG $\frac{1}{2}$ W
R43	3.3 MEG $\frac{1}{2}$ W
R49	0.47 MEG $\frac{1}{2}$ W
C18	4-30 MMFD ERIE N500
C19	75 MMFD CERAMIC ZERO TEMP. COE
C22	0.01 MFD MICA
C24	0.01 MFD MICA
C25	180 MMFD MICA
C26	0.01 MFD MICA
C27	0.01 MFD MICA
C28	0.01 MFD MICA
C40	0.01 MFD MICA
L3	10 mH
L7	10 mH
CR1	1N34

P				
N				
M				
L				
K				
J				
H				
	WAS	APP	DATE	

P.
5

B+, L5



8	SHAKEPROOF LUG	2102-6	3
7	HEX. L. 4-40		2
6	BD HD. SKEW #6-32 1/4 LG.		3
5	SHAKEPROOF LOCKW. #4	1704	2
4	BD. HD. SCREW #4-40 1/2 LG.		2
3	MOUNTING POST C.T.C. 3/8" #X1246D		5
2	TERMINAL LUG C.T.C. #1246D		24
1	TERMINAL BOARD	A-30787-21	
ITEM	MATERIAL - DESCRIPTION	PART NO.	QUAN.

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

TERMINAL BOARD ASS'Y.

SCALE 1/1 DR. H. H. H. 8.2.47

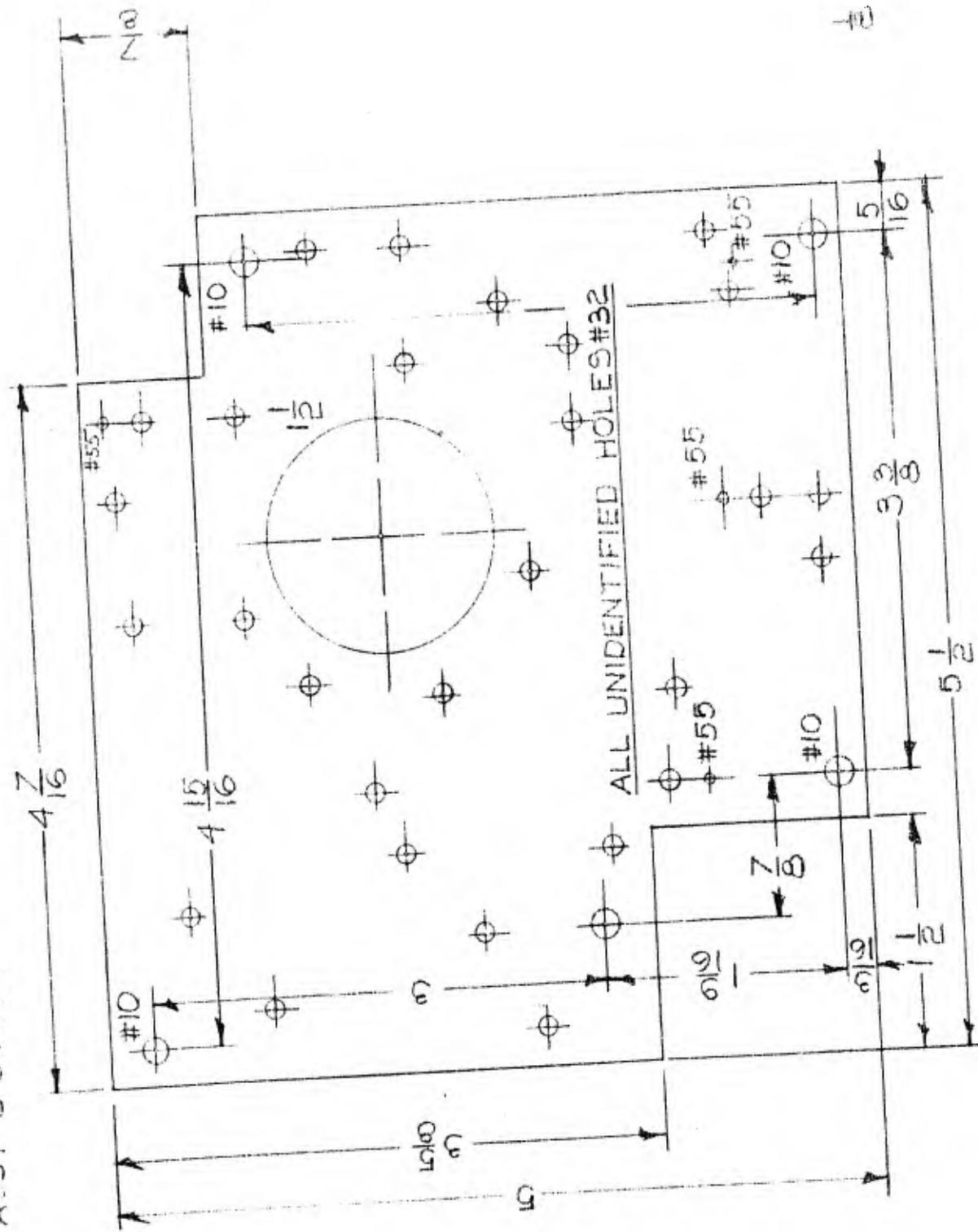
B-30787-5

APP. DATE WAS APP. DATE

CHK. R. H. H. 8.2.47

2

A-3078C 3
USED IN ASSY B-307E7



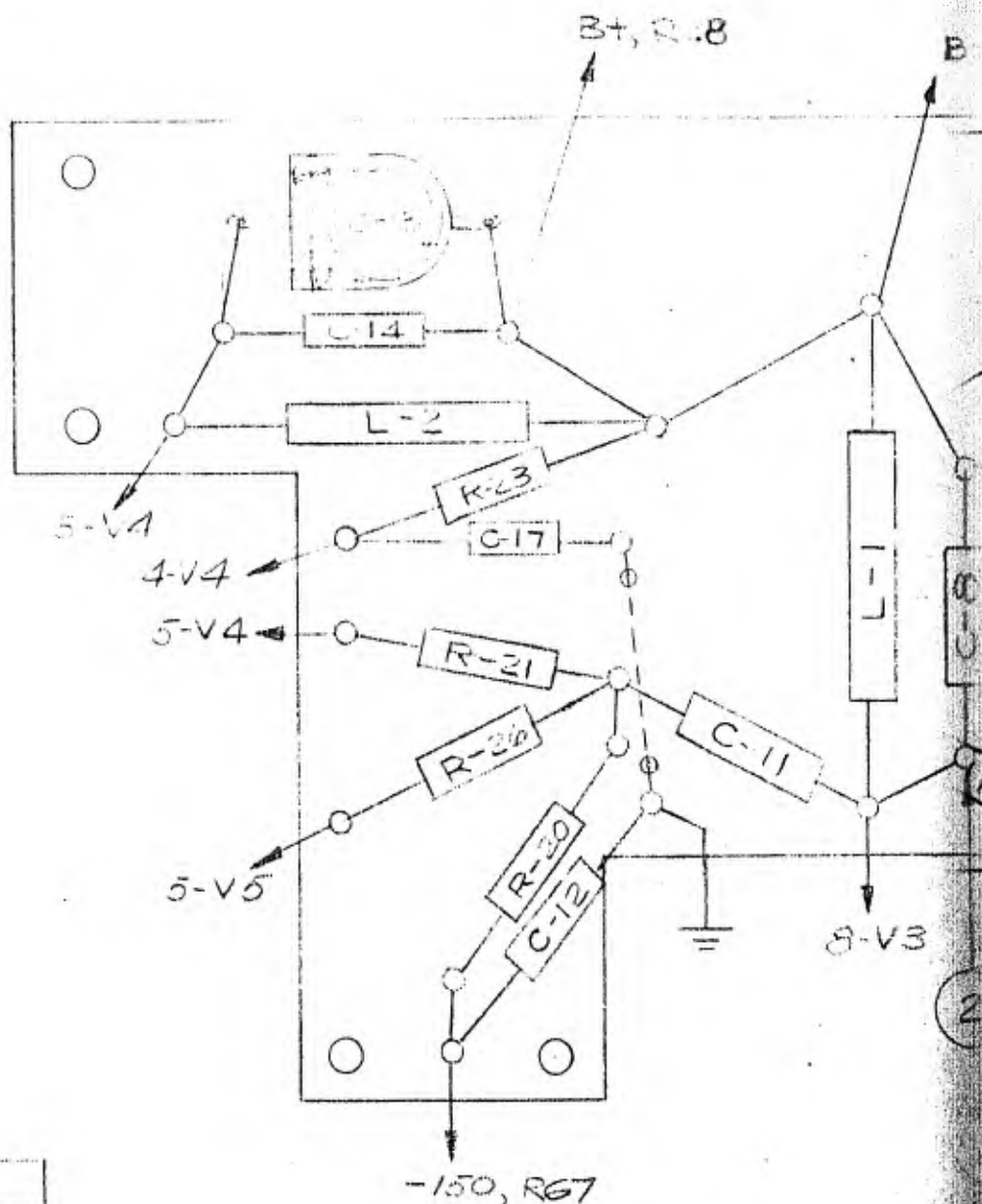
6945 8/24/41 A-3078C-3
N K

B-30809

WO

TOLERANCES: 1% 5% 10% 20% 50% 100%
DECIMAL FRACTIONAL

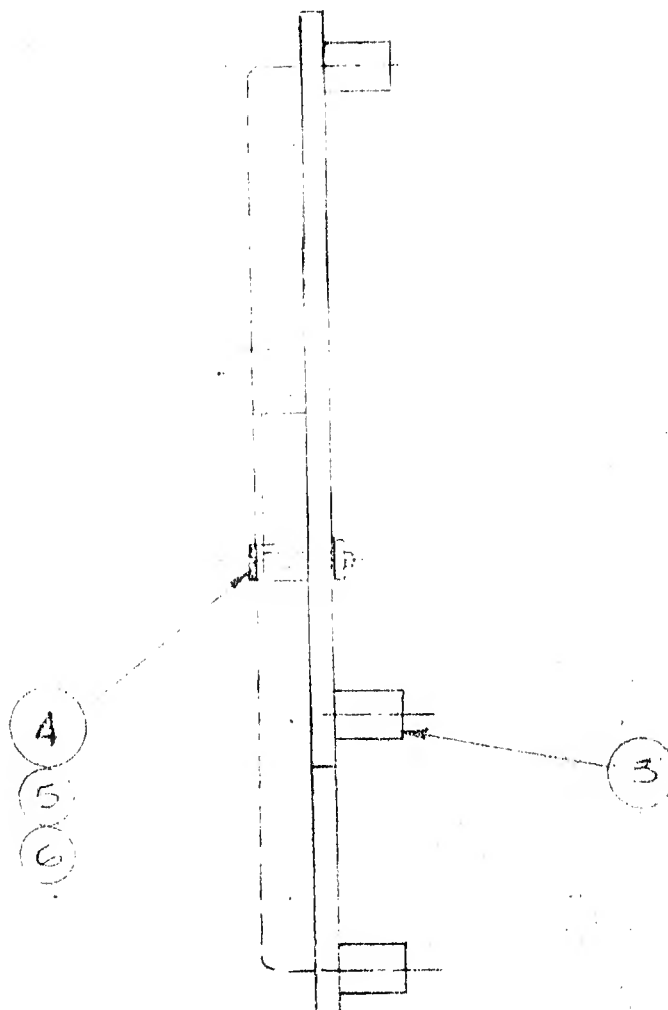
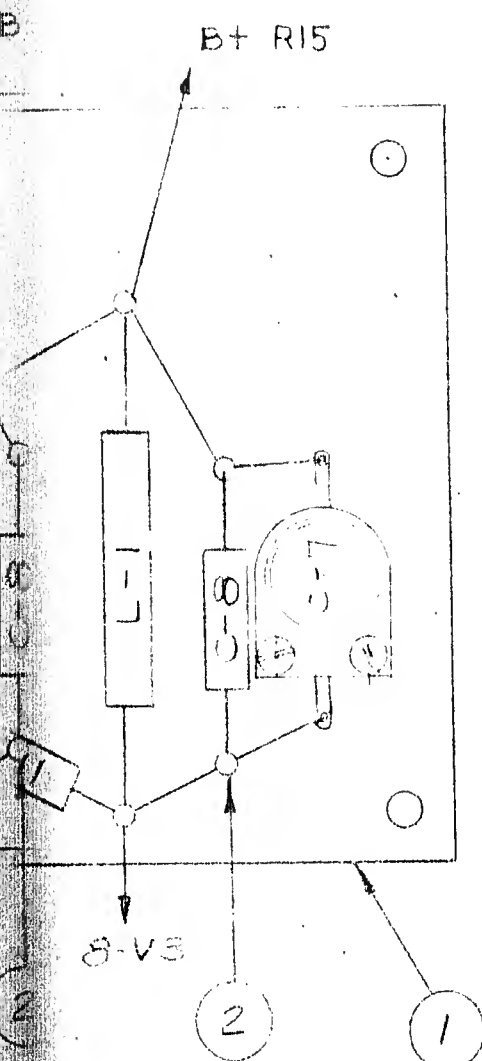
B-30809



ELECTRICAL PARTS LIST

SERIAL NO.	VALUE
R-20	0.47 MEG $\frac{1}{2}$ W
R-21	2200 Ω $\frac{1}{2}$ W
R-22	10,000 Ω 2W
R-23	2200 Ω $\frac{1}{2}$ W
C-7	4-30 MMFD, ERIE 11500
C-8	35 MMFD, CERAMIC ZERO TEMP. COEFF.
C-11	0.001 MFD, MICA
C-12	0.01 MFD, MICA
C-13	4-30 MMFD, ERIE N500
C-14	100 MMFD, CERAMIC ZERO TEMP. COEFF.
C-17	0.01 MFD, MICA
L-1, L-2	1 mH

P					
N					
M					
L					
K					
J					
H					
	WAS	APP.	DATE		



6	HEX. NUT #4-40		4
5	SHAKEPROOF-LOCKWASHER #4	1704	4
4	BD. HD. SCREW #4 40 x 1/2 LG.		4
3	MOUNTING POST 3/8" C.T.C.	X1246-D	6
2	TERMINAL LUG C.T.C.	1724-D	17
1	TERMINAL BOARD	A-30779	1
ITEM	MATERIAL - DESCRIPTION	PART NO.	QUAN.

SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

TERMINAL BOARD ASS'Y

SCALE 1:1

DR. *St. Louis* 12-44

TR.

CH. R.H.M. &
 TL 3/10/47

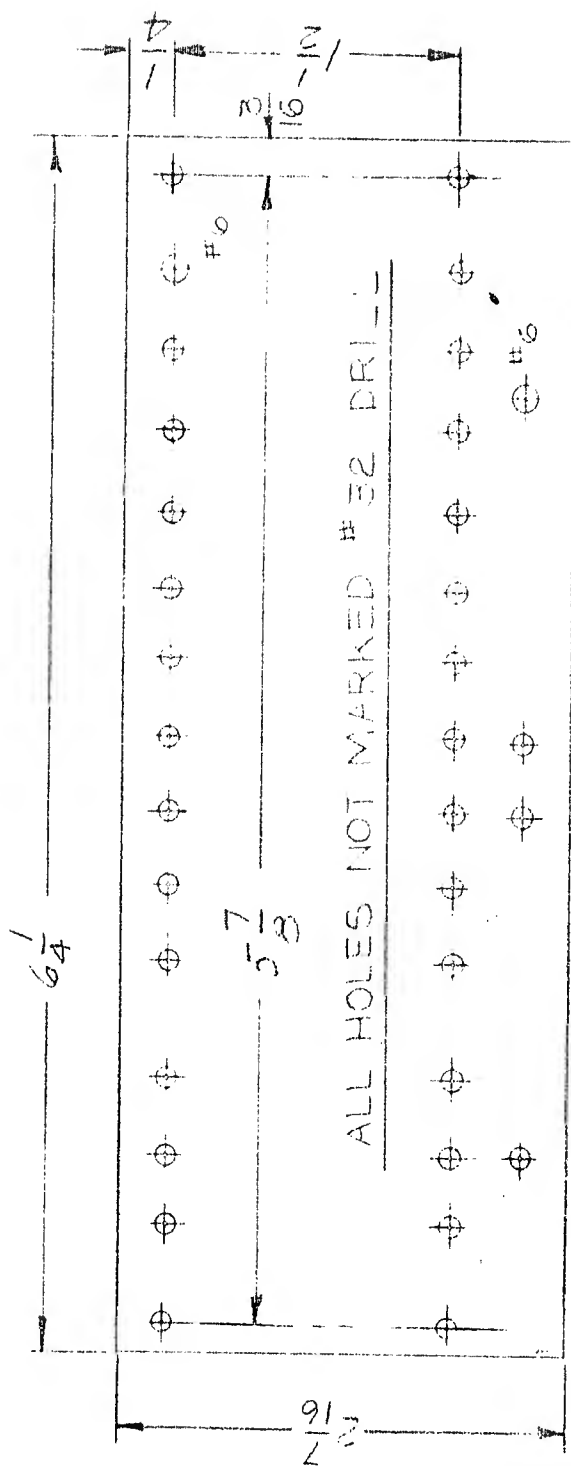
APP.

B-30786-3

DATE WAS APP. DATE

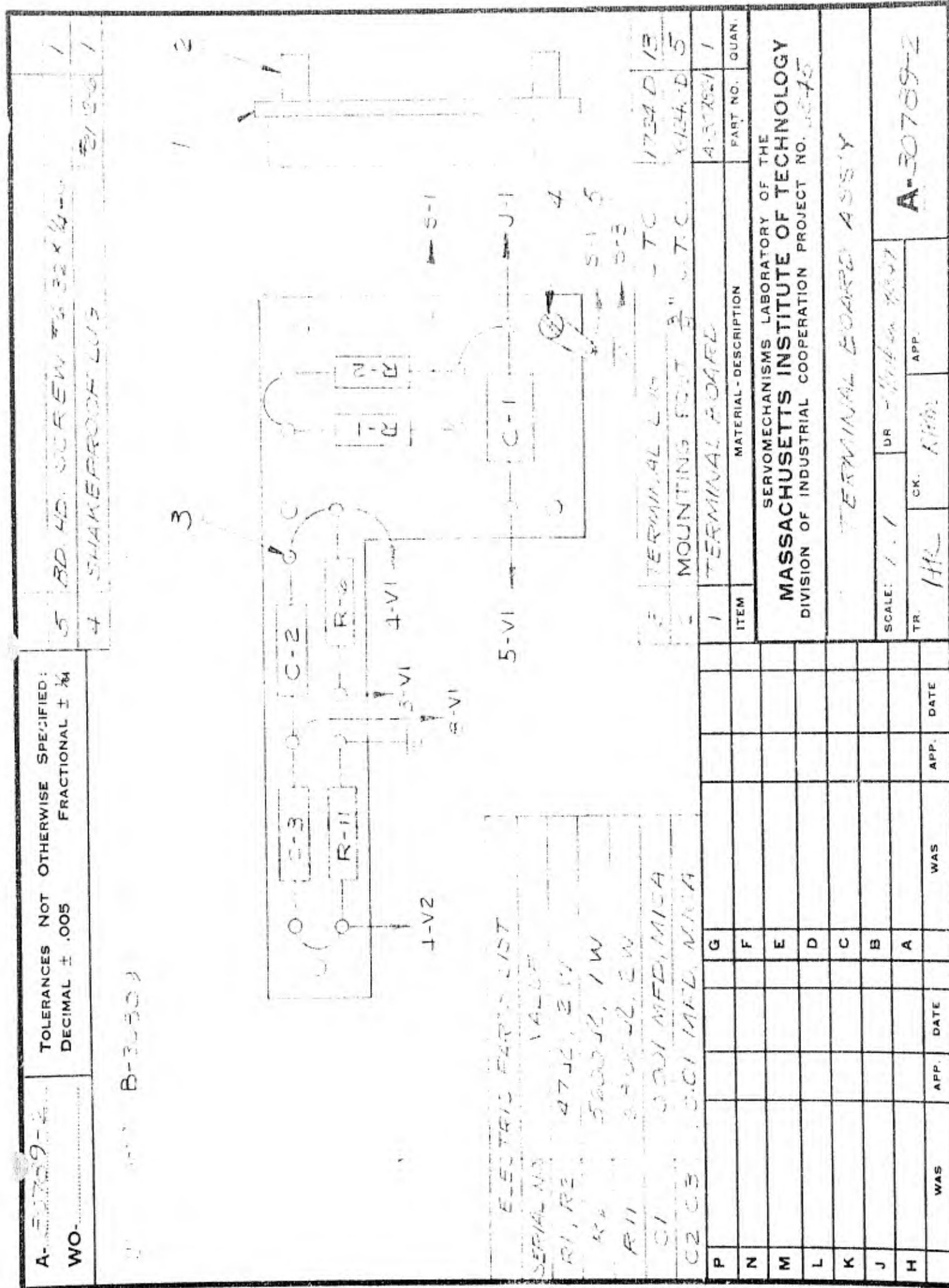
A-30775-2

USED IN ASSY A-30775



LINEAL BAKELITE

MASSACHUSETTS INSTITUTE OF TECHNOLOGY	US CTS 8-847
SERIALS SECTION IN RESEARCH	A-30775-2
FILE NO. 6-45	
CR. RBM	AK



A-100-1
 USED IN N 4-3



100-100-100-100

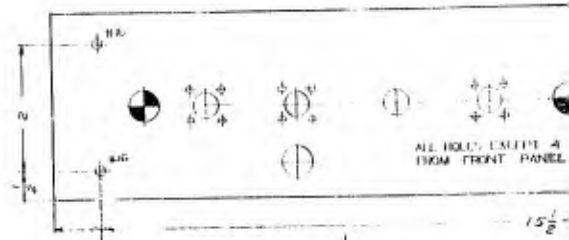
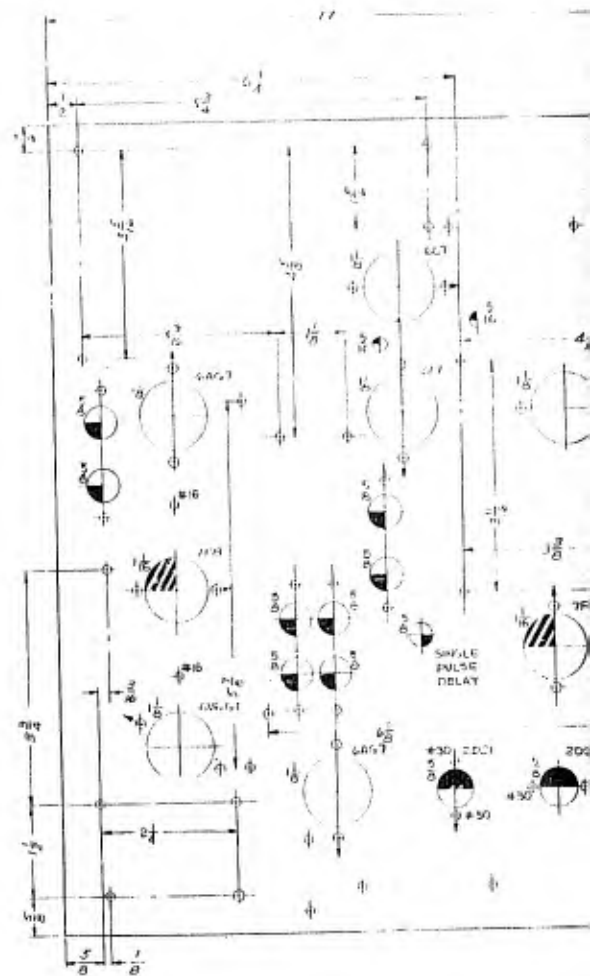
100

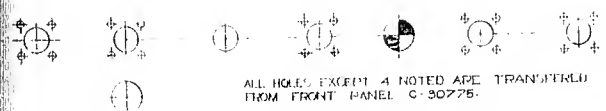
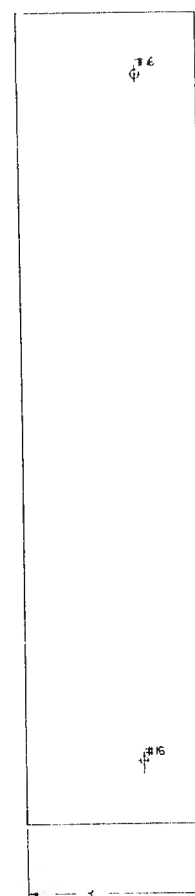
100

100

100

100



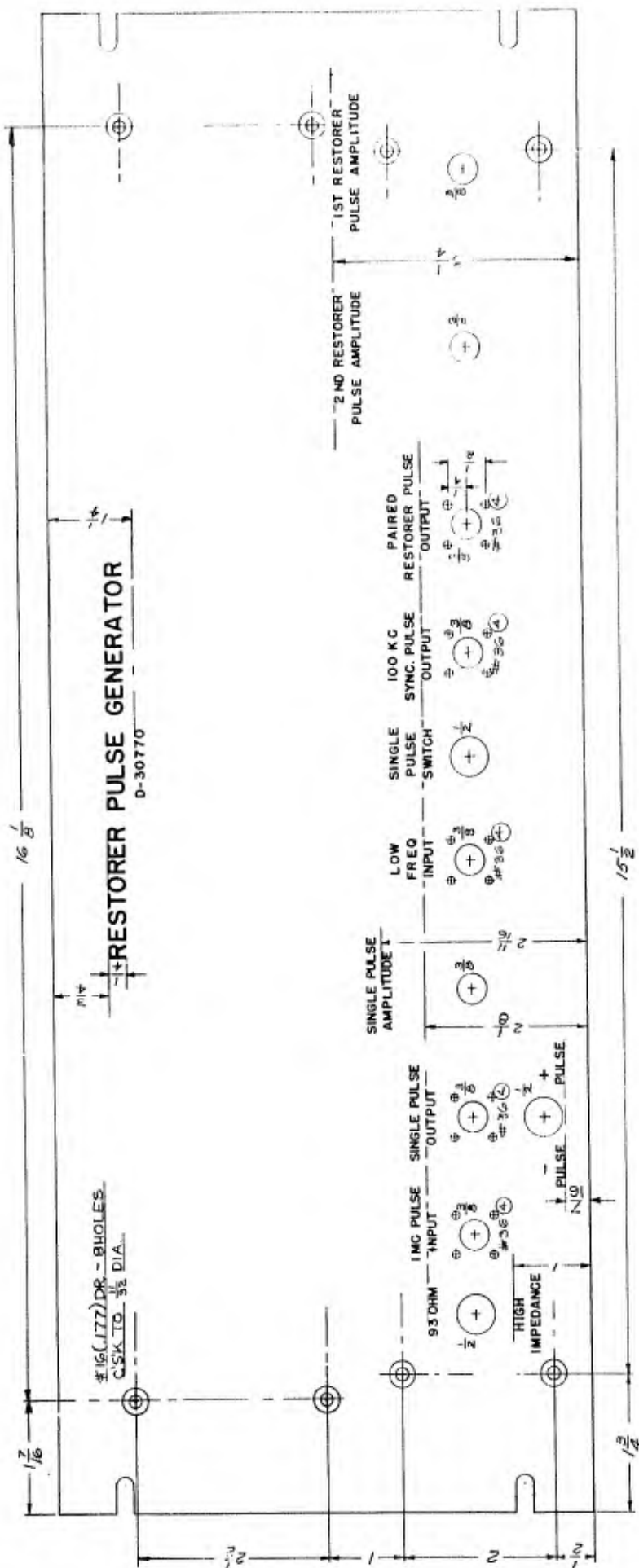


ALL HOLES EXCEPT 4 NOTED ARE TRANSFERRED
FROM FRONT PANEL C-30775.

[illegible]

C-30775
TOLERANCES NOT OTHERWISE SPECIFIED:
DECIMAL ± .005 FRACTIONAL ± 1/16

USED IN ASSY B-30809



NOTE: LETTERING TO BE 1/8 HIGH UNLESS OTHERWISE NOTED

ITEM		MATERIAL DESCRIPTION		PART NO.		QUAN.	
1		7 X 19 X 3/4 PANEL BUD MFG CO.	PA-104	1			
2		RESONANCE LABORATORY OF THE					
3		MASSACHUSETTS INSTITUTE OF TECHNOLOGY					
4		DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 3-25					
5		FRONT PANEL LAYOUT					
6		RESTORER PULSE GEN.					
7		SCALE 1:1					
8		DATE					
9		APP.					
10		DATE					
11		APP.					
12		DATE					
13		APP.					
14		DATE					
15		APP.					
16		DATE					
17		APP.					
18		DATE					
19		APP.					
20		DATE					
21		APP.					
22		DATE					
23		APP.					
24		DATE					
25		APP.					
26		DATE					
27		APP.					
28		DATE					
29		APP.					
30		DATE					
31		APP.					
32		DATE					
33		APP.					
34		DATE					
35		APP.					
36		DATE					
37		APP.					
38		DATE					
39		APP.					
40		DATE					
41		APP.					
42		DATE					
43		APP.					
44		DATE					
45		APP.					
46		DATE					
47		APP.					
48		DATE					
49		APP.					
50		DATE					
51		APP.					
52		DATE					
53		APP.					
54		DATE					
55		APP.					
56		DATE					
57		APP.					
58		DATE					
59		APP.					
60		DATE					
61		APP.					
62		DATE					
63		APP.					
64		DATE					
65		APP.					
66		DATE					
67		APP.					
68		DATE					
69		APP.					
70		DATE					
71		APP.					
72		DATE					
73		APP.					
74		DATE					
75		APP.					
76		DATE					
77		APP.					
78		DATE					
79		APP.					
80		DATE					
81		APP.					
82		DATE					
83		APP.					
84		DATE					
85		APP.					
86		DATE					
87		APP.					
88		DATE					
89		APP.					
90		DATE					
91		APP.					
92		DATE					
93		APP.					
94		DATE					
95		APP.					
96		DATE					
97		APP.					
98		DATE					
99		APP.					
100		DATE					

C-30775-1

INCIDENT

1MC 000 5
CLOCK PULSE
VI-DIN 5



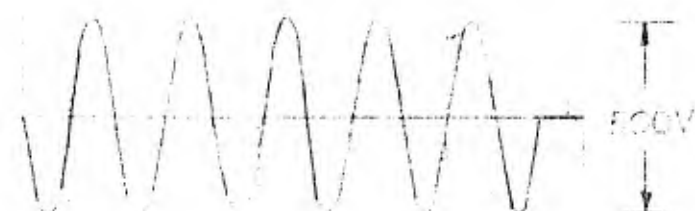
VI-FRII.e



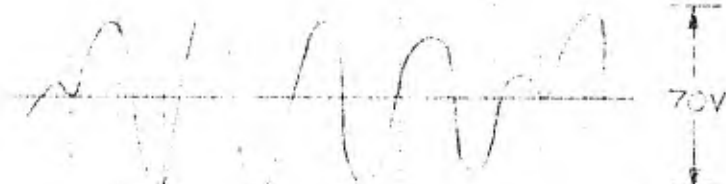
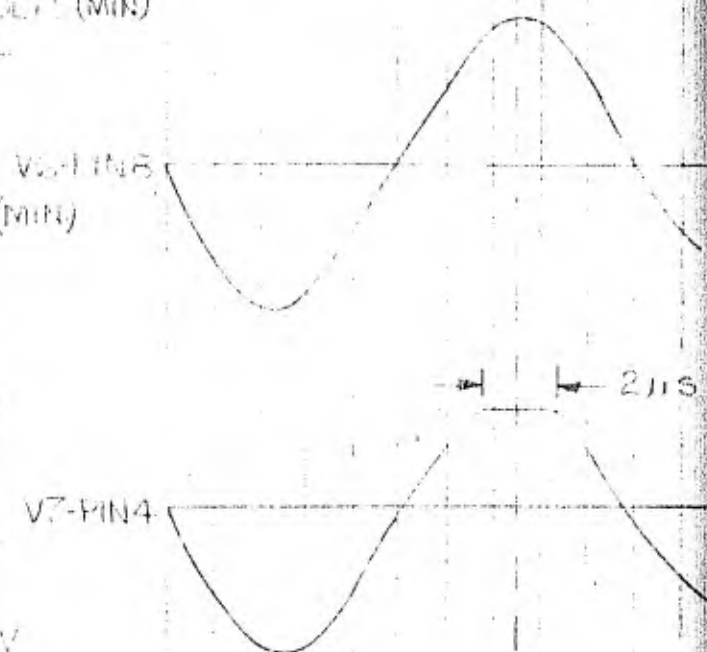
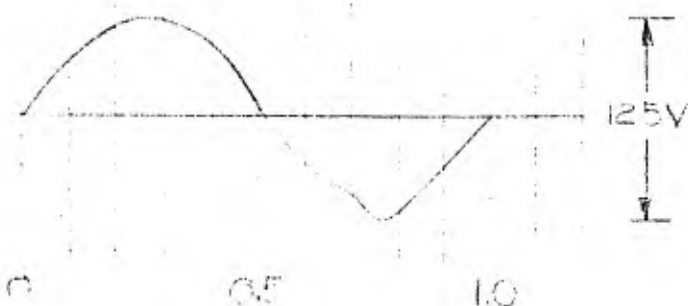
V.I.-FINF 280



V2-4113



V4-PIN 3

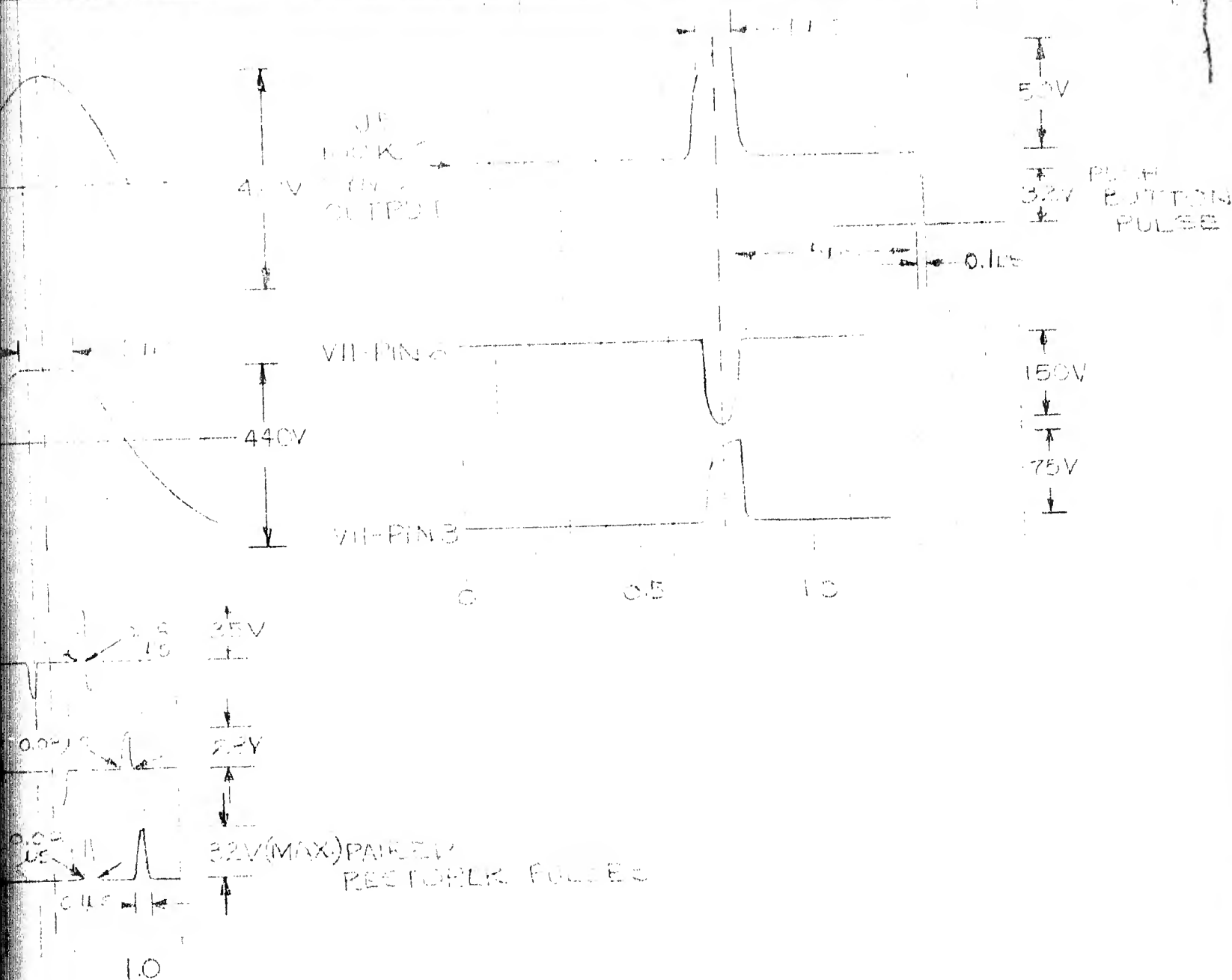
 $\gamma \in \text{PIN}_2$ 

V7-F11E
V8-F11A
V12-F11E

VIP FINE

J2
OUTPUT

0.5 1.0



SERVOMECHANISMS LABORATORY OF THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 DIVISION OF INDUSTRIAL COOPERATION PROJECT NO. 6345

TIMING DIAGRAM OF
 RESTORER PULSE GENERATOR

SCALE: DR. MS. HUGH

ENG. H/K CK. APP.

B-30898